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GEOLOGICAL SURVEY

—OF—

ALABAMA.

REPORT OF PROGRESS FOR 1879 AND 1880.

BY
EUGENE A. SMITH, PH. D.,
STATE GEOLOGIST.

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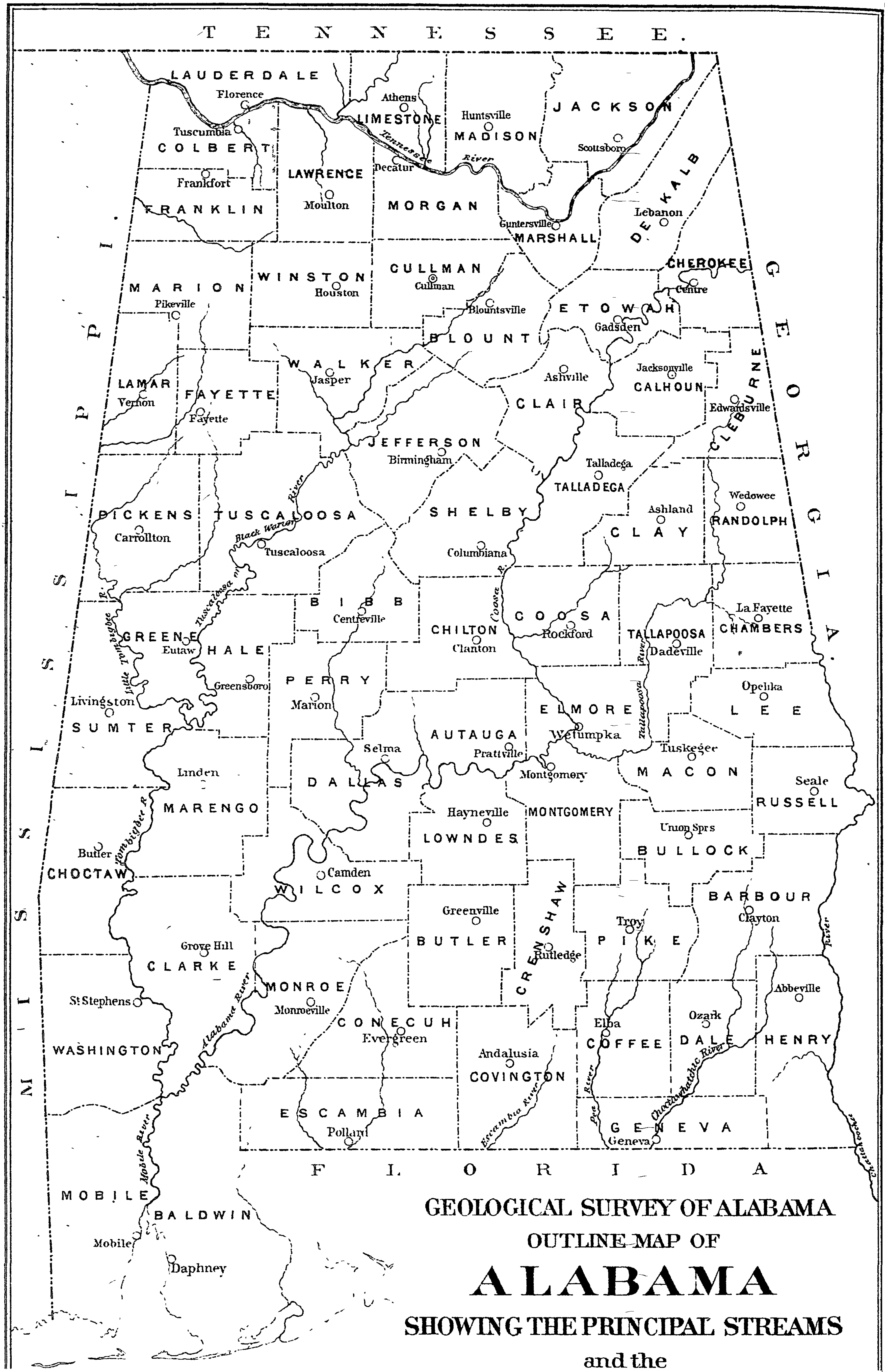

GEOLOGICAL SURVEY OF ALABAMA
OUTLINE MAP OF
ALABAMA
SHOWING THE PRINCIPAL STREAMS
and the

To His Excellency,
RUFUS W. COBB,
Governor of Alabama:

SIR—The Report of Progress of the Geological Survey, for the years 1879 and 1880, is herewith respectfully submitted.

I have the honor to be, sir,
Your obedient servant,
EUGENE A. SMITH,
State Geologist.

UNIVERSITY OF ALABAMA,
December 31, 1880.

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PREFACE.

In accordance with the plan followed in previous years, the present Report continues the description of the Coal Measures of the Warrior Field.

A survey of the Warrior River, from Tuscaloosa to the Sipsey Fork, under the auspices of the War Department, was carried out during the summer months of 1879, by myself, with the assistance of Prof. Henry McCalley and Mr. Joseph Squire.

The object of the survey was, primarily, to ascertain the nature and extent of the obstructions to navigation, and to obtain estimates of the cost of removing or overcoming the same, and, incidentally, to collect statistics of the natural resources of the country, lying adjacent to the River.

In view of the fact that the Reports of the Chief of Engineers have a limited circulation, the consent of Maj. Damrell, by whom the survey was instituted, was obtained—to re-publish for the State, the geological details thus collected, and the present Report is substantially a re-production of one made last winter to Maj. Damrell, embodying the results of the Survey above mentioned.

The constantly increasing demand for information about the almost unknown and unexplored region of the Warrior Field, renders unnecessary any further explanation of the fact that the survey has, for several years, been devoted chiefly to the task of collecting and publishing statistics bearing upon what is destined, in the near future, to be one of the most important industries of the State.

The accompanying map is a copy of one submitted to Maj. Damrell, but with the addition of many geological details, collected since the summer of 1879. In its topography it is probably more nearly correct than any other map of the same region, having been taken from the original plats, and the meanderings of the river having been carefully platted from the original field notes. Upon the map are shown all the localities where outcrops of coal have been observed and measured, the adjoining figures giving the thickness of the bed.

The figures at head and foot of each shoal show the elevation above low water mark at Tuscaloosa. The levelings were made by a party in charge of Prof. Henry McCalley, to whom the whole credit of this laborious and difficult work is due.

The geological statistics were collected by myself, in conjunction with Mr. Joseph Squire, of Helena, Ala., a gentleman well known for the accuracy and trustworthiness of all his work.

To this is added a Report by Henry McCalley, upon the counties lying north of the Tennessee River. Geological maps of these counties are in course of preparation, and will be published in due time.

It is proper to state that Prof. McCalley's report is a gratuitous contribution.

The outline map of the State is inserted for the convenience of readers not familiar with the relative positions of the counties, and it will accompany all future reports.

Through no fault of the printers, but by an oversight of my own, the following errors occur: At the end of the General Section, p. 16, St. Louis Group should read Chester Group.

The differences of elevation as given on pages 18, 33, and 42 are not quite correct, but the true numbers can be obtained from the map.

To Maj. A. N. Damrell, U. S. Engineer, Mobile, Alabama, acknowledgments are hereby made, for his courtesy in turning over, to the use of the State, the results obtained by a survey instituted and carried out under his general direction.

The authorities of the Alabama Great Southern, and of the South and North Alabama Railroads, have placed the survey under obligations for continued favors.

University of Alabama, December 31, 1880.

REPORT.

I.

TOPOGRAPHY AND ECONOMICAL RFSOURCES OF THE WARRIOR RIVER REGION, BETWEEN TUSCALOOSA AND SIPSEY FORK.

By a reference to the map accompanying this report, it will be seen that the Warrior, between the Sipsey Fork and Tuskaloosa, has cut its channel altogether into rocks of the Coal Measures, and that by reason of the varying degrees of hardness of the rocks traversed, the fall between the two points, averaging only 1¾ feet to the mile, is very unequally distributed. The entire fall being 163.84 feet, a fall of 65 feet is found within the first twenty-five miles from Tuskaloosa; of 107 feet, within thirty-one miles and of 129.5 feet to the head of the Fork Shoal, about half the distance, or 48 miles. For the remaining 44 miles the difference in level is only a little more than 34 feet.

In accordance with these facts, we find the lower part of the river, from the head of Squaw Shoals to Tuskaloosa, much straighter, and with comparatively little bottom land.

Above these great shoals, the course of the river is much more winding; there are great bends with large areas of fertile land, especially where the fall of the river is comparatively slight.

Our previous knowledge of the material resources of the country drained by this part of the river, and the present condition of traffic by the river.

It has long been known that coal of good quality and in beds of sufficient thickness, could be found within easy reach of the river, almost the entire distance between Tuskaloosa and Sipsey Fork. Before the introduction of railroads into the State, it was the custom in those parts of Tuskaloosa, Jefferson and Walker counties lying adjacent to the river, for the inhabitants during the summer months to build boats or barges, along the banks of the river, or near the mouths of creeks and other streams emptying into the river, to fill these boats with coal raised in the immediate vicinity, and when the water rose sufficiently high to float the barges, they were guided down the river, the coal finding its principal market in Mobile. Besides the coal, other articles, such as cotton, staves, &c., found their way to a market by the same channel.

This business was precarious at best, because of uncertainty as to time and sufficiency of highwater, and the shooting of the falls, in particular those near the foot of Squaw Shoals, being attended with much danger to property and with some risk of life, this mode of transportation has gradually been abandoned, farmers preferring to haul their produce to Birmingham, Tuskaloosa and other markets, whilst the shipping of coal has ceased entirely.

It needs hardly be said that the chief result of the improvement of the Warror river, would be the development of coal trade. As to the probable extent of this trade, there have hitherto been no means of forming an opinion. The number, locality, value and accessibility of the coal deposits were not definitely known; only the most vague and unreliable reports could be obtained upon these points.

For these reasons, it was thought important in the present survey, to collect as much as possible of accurate and detailed information concerning the quantity and quality of the coal accessible from the river, in order that a correct judgment might be formed as to whether the expenses of the river improvement would be justified by the attainable results.

To this end the attention of the reader is particularly called to the following facts about the coal beds near the river, which have either been collected by the present survey, or which form part of published or yet unpublished material of the State Geological Survey.

II.

GENERAL GEOLOGICAL DESCRIPTION OF THE WARRIOR COAL FIELD.

Before entering into details, a few general remarks concerning the area and the general character of the Warrior Coal Field will not be out of place, but will, on the contrary assist to a correct appreciation of much that follows.

The area of the Warrior river is usually estimated at 5,000 square miles; of this, 3,500 square miles are drained directly by the Warrior and its tributaries, and this area of Coal Measures would be opened to the outside world by the proposed improvement of the river.

Of the actual number of the coal seams traversed by the river, we cannot, as yet, be *certain*, our knowledge is too limited; but it is possible by giving a general description of this basin, together with a measured section obtained in that part of the field whose mining operations have been most extensively carried on, and then by giving the details lately collected, to place in the hands of an intelligent reader, the means of forming an approximately correct judgment concerning the capabilities of this great and almost unknown field.

By reference to a Geological Map of Alabama, it will be seen that the Coal Measures of the State are divided into three distinct fields, separated by long narrow valleys running northeast and southwest, in which the strata of formations older than the Coal Measures form the surface rocks. These three fields have been named by Prof. Tuomey, from the rivers that drain them, the Coosa, the Cahaba and the Warrior fields. The Geological Map will show also that the Warrior field itself is divided into several distinct parts by similar long and narrow valleys—Wills', Murphrees' and Brown's.

The significance of these valleys will be best understood by recalling some of the more important points in the geological history of the Appalachian chain, of which a part of the southwestern end is formed by our Coal Measures.

During the long geological period which preceded the elevation of the Appalachians, the area occupied by this chain was alternately a coal marsh, a lake, or an arm of the sea, into which sediments were brought down from north, east and west, until 10,000 feet or more were deposited. (LeConte.) During the whole of this time this area was slowly subsiding, so as to maintain nearly the same level. At the end of the Coal period, occurred what has been called the Appalachian revolution. The great mass of sediments accumulated as above described, yielded to pressure, was crushed together and folded and swollen upwards, forming the Appalachian chain. (LeConte.)

The Coal Measures of Alabama, forming a part of this uplifted area, were crushed and thrown like the rest into long, narrow folds or wrinkles running approximately parallel to the general direction of the chain, i. e. northeast and southwest. Some of these were simple folds, others were broken or rent along the crest line, thus giving a channel for denuding waters, which have subsequently eroded them down into valleys, in which the strata on each side slope away from the central line, (anti-clinal valleys.) In other cases, the fracture being more profound, the strata on one side of the line of fissure have slipped below, or have been pushed up above the same beds on the other side of this fissure producing what are known as *faults*.

The long, narrow valleys spoken of above, as dividing the Cahaba from the Warrior field, and the Warrior field itself into distinct parts, are instances of these anti-clinal valleys. But the Coosa field is separated from the Cahaba by a fault in which the displacement is so great as to bring to the same level, the Lower Silurian rocks and those of the Coal Measures.

The only one of these valleys in which we are interested in this connection is Brown's. This is the continuation into Alabama, of the great Sequatchee valley of Tennessee. It ends *as a valley* near Blount Springs, but the great fold, of which it is the eroded or scooped out part, continues southwestward *as a ridge* towards the confluence of the two branches of the Warrior. Below Blount Springs it can be traced for some distance, but it gradually sinks away into the general level of the country.

The Warrior Field has, for convenience, been divided into the Plateau or Table Land region, and the Warrior Basin. There is, of course, no sharp line of division between these two parts, the Plateaus sinking gradually into the Basin proper, still we may assume that the Plateaus extend southwestward as far as the conglomerates in the lower part of the Measures from the surface rocks, and where the underlying Sub-Carboniferous limestones lie above or near the general drainage level of the country.

Upon this principle the Measures in Jackson, DeKalb, Marshall, Morgan, Blount and the eastern half of Winston, and the northeastern corners of Walker and Jefferson counties, together with those forming the northern rim of the Warrior field in Lawrence, Winston, Franklin and Marion counties would be assigned to the Plateau region, whilst those of the rest of Winston, Walker and Jefferson, and all of Tuskaloosa and parts of Fayette and Marion counties, would belong to the Warrior Basin.

It is the Warrior Basin proper which would be opened by a navigable river, and it is this part of the field, therefore, to which the present report will be devoted.

From what has been said above, it will be seen that Brown's valley and its prolongation southwestward as a low ridge, divides the Warrior basin into two parts of unequal area, viz: a narrow strip drained by the Locust Fork, or Little Warrior, lying southeast of the anti-clinal ridge, and the wide expanse of the basin on the northwest drained by the Mulberry Fork or Big Warrior, with its tributaries. Of these two parts, the southern, or that drained by the Little River, has been most thoroughly explored, especially along the line of the South and North railroad, and in the vicinity of Birmingham. We shall therefore give first a general section of this part of the Basin, (taken from my Report for 1877–78,) showing approximately the number of coal seams and the thickness of the Measures in this part of the State, after which, the seams occurring in other parts of the Basin will be described and, wherever it is possible to do so, referred to their proper position in the general section.

General Section of that part of the Warrior Basin lying between the Locust Fork and Jones' Valley.

Surface soil—of variable depth.......	—		—	
COAL, *Guide Seam*........................	0	ft.	3	inches
Sandstones, Shales, &c..................	115	“	0	“
COAL, *Pratt Seam*........................	4	“	8	“
Sandstones, &c............................	20	“	0	“
COAL, *Sixteen Inch Seam*..............	1	“	4	“
Sandstones, Shales, &c..................	30	“	0	“
COAL, ...	2	“	4	“
Sandstones, &c............................	5	“	0	“
COAL, *Four Foot Seam* in two benches of equal thickness with 8–inch slate parting..............................	4	“	8	“
Sandstones, Shales, &c..................	50	“	0	“
COAL, *Quadruple Seam*............	6 or 7	“	0	“
Sandstones and other measures...	20 or 30	“	0	“
COAL, *Slaty Seam*........................	1	“	6	“
Sandstones, &c............................	35	“	0	“

COAL, slaty, one bench 2 ft. thick	8	ft.	0	in.
Sandstones, &c	100	"	0	"
COAL, *Double Seam*, two seams, 8 in. and 15 in., with 5 feet of shale between	7	"	0	"
Sandstones, &c	100	"	0	"
Shales	25	"	0	"
COAL, good	4	"	6	"
Sandstones, &c	25 to 30	"	0	"
COAL, small seam	1 or 2	"	0	"
Shales, &c	6 to 10	"	0	"
COAL, in two benches of 3 and 15 in., with 2 or 3 feet of slate between	4	"	0	"
Sandstones, &c	100	"	0	"
COAL	2	"	2	"
Shales and other measures	50	"	0	"
COAL, double seam, thickness unknown	—		—	
Sandstones, Shales, &c	300	"	0	"
COAL, *Newcastle Seam*, (slaty)	5' 8" to 6	"	3	"
Sandstones, &c	15	"	0	"
COAL, poor	1	"	10	"
Fire-clay 3 ft., and Sandstones 20 ft.	23	"	0	"
COAL	2	"	6	"
Sandstones, &c	25	"	0	"
BLACK BAND IRON ORE	1	"	4	"
Sandstones	20	"	0	"
COAL, poor, full of slate	4	"	9	"
Fire-clay and arenaceous clays	20 to 30	"	0	"
CONGLOMERATE	16 to 20	"	0	"
COAL, with shale	1	"	6	"
Sandstones, shales, &c	81	"	10	"
COAL, good, hard	1	"	6	"
Sandstones	40	"	6	"
COAL, good, *Jefferson Seam*	3	"	3	"
Sandstones, &c	29	"	5	"

COAL, good, *Black Creek Seam*	2 ft.	6 in.
Sandstones, &c	139 “	0 “
COAL, doubtful	1 “	6 “
Sandstones, with fossil shells	85 “	0 “
COAL	1 “	2 “
Sandstones, &c	30 “	0 “
CANNEL COAL and BLACK BAND	2 “	4 “
Slate, hard	4 “	0 “
COAL, good, *Warrior Seam*	2 “	9 “
Clays, sands, &c	20 “	5 “
COAL	1 “	8 “
Clay and sandstone	7 “	6 “
COAL, hard	2 “	2 “
Shales, sandstones, &c	295 “	6 “
COAL, hard and bright	1 “	6 “
Sandstone and fire-clay	17 “	0 “
COAL	1 “	4 “
Shales, with coal plants	12 “	0 “
COAL, good	2 “	6 “
Standstones, clays, &c	102 “	7 “
Shales and sandstones, with two thin seams of coal near bottom of the series	450 “	0 “
Siliceous sandstone, often a conglomerate, base of Coal Measures	100 “	0 “

Below these follow:

SUB-CARBONIFEROUS ST. LOUIS GROUP.	Shales	80 “	0 “
	Limestone, with Pentranites	75 “	0 “
	Silic. sandstones	60 “	0 “

In this section there are about 2,600 feet of Coal Measures, including between thirty and thirty-five seams of coal. Five of these seams have been extensively mined.

III.

SPECIAL DESCRIPTION OF THAT PART OF THE WARRIOR BASIN, LYING ADJACENT TO THE RIVER, BETWEEN TUSCALOOSA AND SIPSEY FORK.

The area here indicated, includes parts of the counties of Tuskaloosa, Jefferson and Walker.

As to the position of the coal seams of the central and southwestern part of the basin, very little can as yet be said with certainty.

Whilst in many parts of this basin, it appears in the present state of our knowledge, that only the lower seams of the general section (below the Newcastle) occur, yet is the opinion of Mr. Joseph Squire, who has had much experience in the examination of the coal measures of the State, and whose judgments are generally very correct, that the *Pratt Seam* (near top of the General Section) occurs in the vicinity of Old Warrior Town. If this surmise be correct, then we have in part, at least, of the area drained by the Big Warrior, the full series of measures as given in the preceding general section. Over what extent of country these upper measures, including the Pratt Seam, will hereafter be found to spread, can, at this time, be only a matter of conjecture.

As the best manner of presenting the resources of the country adjacent to the river, I shall give the localities of actual outcrops of coal along the river, together with sections of the seams, and analyses of *average samples* of the entire thickness of each seam, wherever it has been possible to obtain such samples. It must be understood, however, that these analyses show the quality of the coal, not in its freshly-mined condition, but after having been exposed for an indefinite length of time to the influence of the weather. This will be understood when it is said that all the samples have been taken from surface outcrops, because in the great majority of cases the seams have not been worked and the coal was accessible near the surface only.

Bearing these things in mind, it will be seen that whilst the accompanying analyses may be considered as representing fairly well the relative values of the different coals, they do not show the actual composition of the *freshly mined* coal, having been made in every case from more or less weathered samples.

A few words more concerning the method of selecting the samples for analysis. In every case where the contrary is not expressly stated, the full thickness of the seam was laid bare, then a stripping was made from top to bottom of the seam, including the thin layers of shale, such as would not be separated from the coal in mining. This sample of the entire seam, including the thin layers of slate or shale, was, in the laboratory, run through a small Blake crusher, and the coarse powder thus obtained, was then thoroughly mixed and separated into five piles. One of these was again divided into five parts, and this method was continued until a pile of proper size for analysis was reached. Thus, an *average sample* of the original average sample of the entire seam was always obtained for analysis. In this way, therefore, we may be sure that the following analyses show what would be the character of the coal *as it would come from the mine*, and not of picked specimens.

I may also state that as the samples were taken in almost every case from more or less weathered outcrops, the percentage of *ash* in the analyses is uniformily greater than it would be if the analyses had been made from freshly-mined, unweathered samples. The high percentage of moisture, in many of the analyses, shows where the samples have been particularly badly weathered. From these causes it will be seen that the coal mined from any of the seams examined and here reported upon, will always be of better quality than is indicated by the analyses.

Section 1. *From Tuskaloosa to the foot of Squaw Shoals. Distance* 26 *miles. Difference of Elevation* 70 *feet.*

By reason of a fault in the measures, by which there is a vertical displacement of about 55 feet, it is not yet certainly known whether there are two or three seams at Tuskaloosa. Thus, back of the Insane Hospital, a seam has been worked by drifts 75 feet or above the level of the river, and another is now worked in a shaft 60 feet deep and 20 feet perhaps below river level. At the McLester Shaft, also, near the town of Tuskaloosa, a seam is worked which is like the lower seam at the Asylum, in being below a conglomerate, whilst it differs from the Asylum seam in having very little slate and also in the character of the coal.

Coal from McLester Shaft.

Specific Gravity	1.283
Sulphur	1.861
Moisture	2.245
Volatile Matter	35.130
Fixed Carbon	55.301
Ash	7.324
	100.000

A sample of the coal from the Asylum Shaft, upon analysis, gave the following result:

Coal from Asylum Shaft.

Specific gravity	1.397
Sulphur	1.867
Moisture	1.892
Volatile Matter	32.011
Fixed Carbon	55.364
Ash	10.733
	100.000

I give below a section of the Measures in the vicinity of Tuskaloosa. In this section the Asylum seam and the McLester seam are assumed to be the same, though they may be distinct seams. The miners are all of the opinion that they are distinct; and that the Asylum seam is 75 to 80 feet below the McLester.

Section near Tuskaloosa.

Surface. Drift, pebbles, etc.		
Soft sandstones..........................	50 ft.	0 in.
COAL, upper bed, formerly worked by drifts, thickness unknown.		
Sandstone and conglomerate (the latter in places, at least 50 ft. thick).	100 ft.	0 in.
COAL, lower bed, Asylum shaft (may be same as McLester shaft)..........		26–18 "

On the oppostie side of the river, and about two miles from Tuskaloosa, in section 15, T. 21, R. 10, W., occurs a seam of coal, long worked at what is known as the Hewell mine. This coal enjoys a good reputation, but I am not able to give a detailed section of the seam or an analysis of the coal.

Above Tuskaloosa, in T. 21, R. 9, W., we find many openings upon a thin seam of very excellent grate coal. This seam is worked by drifts in the rudest possible manner. The outcrops are along the tributaries of Hurricane Creek in sections 10, 15, 16, and 22 of this township. At all these places the coal has much the same character and the following sections and analyses will answer for many.

Section at Prude's Lower Mine.

Heavy bedded sandstone roof, the upper part of which is a conglomerate.

Gritty slate..............................	0 ft.	3½	in.
COAL, good, hard, free from slate.....	0 "	10	"
Parting	—	—	
COAL, softer but very good............	0	8	"
Clay slate bottom.			

Analysis of Coal from Prude's Lower Mine.

Specific gravity	1.327
Sulphur	.626
Moisture	5.426
Volatile matter	31.952
Fixed Carbon	59.455
Ash	3.167
	100.000

Section at Mrs. Chambers' Mine.

Heavy bedded sandstone roof.

Gritty slate	1 ft.	8 in.
COAL	1 "	3 "

Clay slate bottom.

Analysis of Coal from Chambers' Mine.

Specific gravity	1.281
Sulphur	2.380
Moisture	1.838
Volatile matter	30.682
Fixed Carbon	64.339
Ash	3.141
	100.000

This seam having in most places a massive sandstone roof is easily mined, and being entirely free from slate, it is one of the best coals for domestic use, brought to the Tuskaloosa market. Other openings on this seam are known as the Foster and Keene mines.

In the northeast corner of this township and the adjoining parts of T. 21, R. 8, and T. 20, R. 9, are many openings principally upon what is known as the University seam.

The following sections will show the character of this seam.

Section of Goree bed, S. 7, T. 21, R. 8, Tuskaloosa Co.

Yellow gritty slate several feet thick.

	ft.	in.
COAL	0	1
Decomposed yellow clay slate	3	0
COAL, in cubical blocks	0	2
Blue clay slate	1	2
COAL	0	3
Blue clay slate	1	3
Shaly coal	0	2
COAL, with cubical fracture or jointing.	1	4
Slate	0	1
COAL, good, slightly bony	1	1

Blue, gritty fossiliferous slate bottom.

Section of University Seam at University Mine, S. 2, T. 21, R. 9, West.

Heavy bedded sandstone above.

	ft.	in.
Hard slate	15	0
Soft, gritty fossiliferous slate	2	0
COAL, good	0	10
Slate	0	¾
COAL	0	1
Slate	0	2
COAL	0	3½
Slate	0	8
COAL, good, hard	0	9
COAL, rather bony	0	3
Very black bituminous shale, the upper part a very bony coal	0	9

A lower bench of coal ixists, but could not be seen here.

At the *Ashe Mine* in this vicinity, the following section has been obtained:

Coarse grained heavy bedded.		
Sandstone with layers of conglomerate.	3 ft.	0 in.
Clay slate	0 "	3 "
Bituminous shale	0 "	1 "
Clay slate	0 "	3 "
COAL	0 "	2 "
Slate, compact	0 "	8 "
COAL	0 "	2 "
Slate	0 "	8 "
COAL, main bench, 15 in. seen, said to be	2 "	0 "

On the opposite (north) side of the river, the same seam has been opened in several places. Thus, near the mouth of Yellow Creek, S. 35, T. 20, R. 9, W., at what is known as the *Peacock Mine*, it shows the following section:

	ft.	in.
Gritty slate roof, at least	20	0
Soft, gritty, fossiliferous slate	0	10
Parting slate	0	1
COAL, good	0	7
Slate	0	¼
COAL	0	1½
Slate	0	½
COAL, good	0	3½
Black Shale	0	2½
COAL, good	0	10
Curly, gritty slate bottom.		

Also on Jim Mack's branch in same section as above, the bed is exposed in the bluff of the branch and exhibits the following section:

Section of University Seam on Jim Mack's Branch, S. 35, T. 20, R. 9, W.

	ft.	in.
Gritty slate	20	0
Parting slate	0	1
COAL, good	0	8½

	ft.	in.
Slate	0	¾
COAL, good	0	5½
Slate	0	4
COAL, good cubical blocks	0	9½
Bony coal	0	1½
Black Shale	0	2½
COAL	0	11
Slate	0	3
COAL	0	2
Black Shale	0	3
Bottom Slate.		

The following analyses made from samples taken of the entire thickness of the seam, will show sufficiently well the character of the coal.

Analysis of coal from the University Seam :

	1	2	3
Specific gravity	1.386	1.298	1.393
Sulphur	.870	1.038	.765
Moisture	2.062	1.833	7.285
Volatile matter	31.103	36.233	28.989
Fixed carbon	55.495	54.534	54.522
Ash	11.340	7.400	9.204
	100.000	100.000	100.000

No. 1. From Goree bed.
No. 2. " University mine, excepting the lowest structure.
No. 3. " Jim Mack's branch.

On the south side of the river in the vicinity of the University Mine, another seam of coal, some 25 feet or more below the University seam, has been worked to a limited extent, at the Manly opening. A section of this seam is as follows :

Section at the Manly Bed, S. 1, T. 21, R. 9, W.

Very coarse grained, dark grey sandstone with some pebbles in it, at least	20 ft	0 inches
Gritty slate, ferruginous stains on joint surfaces	2 "	6 "
Coal, excellent, free from slate	1 "	6 "

An analysis of an average sample of coal from this place, shows the following composition in 100 parts:

Specific gravity	1.277
Sulphur	.752
Moisture	2.004
Volatile matter	33.833
Fixed carbon	61.872
Ash	2.291
	100.000

In the bed of the river, at Ward's Shoals, and twenty-five or thirty feet below the University seam, is another seam from which some coal has been raised. This may be the same as the Manly seam.

On the north side of the river, on the Jim Mack branch and twenty-five or thirty feet above the University seam, there is another smaller seam of six inches thickness, imbedded in slaty sandstones.

The following general section of the measures on both sides of the river, and near the mouth of Hurricane Creek, is here given to show the relative positions of the coal seams above described:

Approximate general section of the Measures in vicinity of mouth of Hurricane Creek, Tuskaloosa County.

Conglomerate	10 to 15 ft.
Heavy bed sandstone (slaty above.)	50 "

(4) COAL, (*Prude, Foster, Chambers, &c.*)	1½ to 2 feet
Slaty sandstones, with conglomerate	60 to 70 "
(3) COAL, (*upper seam, Jim Mack's branch.*)	6 in.
Slaty sandstones, &c.	25 to 30 "
(2) COAL, (*University Seam, Goree, Ashe, &c.*)	3 to 4 feet
Measures	25 "
(1) COAL (*Manly seam,* and *in bed of river.*)	1 foot 6 in.

On the northern side of the river, near Yellow Creek, several seams have been opened and small quantities of coal raised from them.

In S. 27, T. 20, R. 9, W., the following section was made of what has been called the *Block Coal Seam:*

Blue slate, in places resembling soapstone.

COAL, slightly bony, top very bony	2 feet	0 inches
Soft slate	0 "	2 inches
COAL	0 "	3 inches
Slate	0 "	1 inch.
BLOCK COAL	0 "	4 inches

An analysis shows the following composition—sample much weathered:

Analysis of coal from *Block Coal Seam.*

Specific gravity	1.411
Sulphur	1.613
Moisture	2.239
Volatile matter	34.606
Fixed carbon	50.375
Ash	12.780
	100.000

In the same neighborhood is what has been called the *Double Seam*, of which the following is the section:

Slaty sandstone (sometimes conglomerate)	5 feet	0 in.
COAL, good	0 "	8 "
Slate parting	0 "	½ "
COAL,	0 "	2 "
Slate parting	0 "	¾ "
COAL	0 "	5 "
Dark, hard, curly slate, fossilferous	2 "	0 "
COAL, all good, free from slate	1 "	2 "
Slate bottom.		

An analysis of this coal shows the following composition in 100 parts:

Coal From Double Seam.

Specific Gravity	1.304
Sulphur	2.129
Moisture	1.810
Volatile Matter	34.029
Fixed Carbon	58.240
Ash	5.921
	100.000

This coal has the reputation of being the best coal near Tuskaloosa, on the river, except that from an underlying seam which is said to be 2 feet thick.

The following approximate general section of the measures on Yellow Creek, in the Jacob Snider settlement, will show the relative position of the seams exposed in Sections 20, 21, 22, 27, 28, etc., in T. 20, R. 9, W. The connection between this section and that given for the opposite side of the river, is not yet certainly made out; it seems probable, however, that the Block Coal seam and the University seam are the same.

General Section of the Measures on Lower Yellow Creek in the Jacob Snider settlement, S. 28, etc., T. 20, R. 9, W.

Orange Sand, or Stratified Drift, pebbles and sand, Blue Slate, on dry hills becoming like blue soapstone.

(3) COAL, *Block Coal Seam* (Univ. seam?)
2 ft. 6 in. to 2 ft. 9 in.
Sandstone, coarse grained in lower part 35 "
Coarse sandstone and conglomerate, most of it conglomerate with many black pebbles........ 25 "
Sometimes five feet of slaty sandstone follow this; but sometimes it is wanting and the conglomerate lies directly over the coal.
COAL........... 14 in. }
(2) Sulphury slate 24 " } Double Seam 4 ft. 4 in.
COAL........... 14 " }
Bottom Slate.
Massive sandstone, part laminated forming cliffs........ 80 "
COAL, said to be very free from slate.... 2 "
Level of water in Yellow Creek.

Nearly opposite the mouth of Daniel's Creek, in S. 13, T. 20, R. 9, W., near James Beavers', a seam occurs, said to be twenty inches in thickness.

An analysis of this coal shows the following composition in 100 parts:

Specific Gravity	1.311
Sulphur	.660
Moisture	2.513
Volatile Matter	31.977
Fixed Carbon	60.033
Ash	5.477
	100.000

On the eastern side of the river on Daniel's Creek, one or two miles from the river, there is said to be a thick seam of coal, from which, however, no samples have been taken for analysis. Further up the Creek, and near the Plank Road, is a seam of coal which greatly resembles *Cannel coal,* of which the following analysis shows the composition:

Specific Gravity	1.348
Sulphur	2.752
Moisture	.830
Volatile Matter	36.207
Fixed Carbon	48.319
Ash	14.644
	100.000

In sections 25, 26, 35 and 36, of T. 20, R. 8, W., and in sections 1 and 2, of T. 21, R. 8, are at least two, and probably three distinct seams of coal.

One of these seams is three feet in thickness and has afforded some excellent coal to the Tuskaloosa market. So, also, in the same Township 20 and in R. 7, W., are occurrences of coal seams of great interest, but lying as they do at a distance of five or six miles from the river, I shall pass them over with a few notes concerning the thickness of the beds. No analyses have been made.

In the northeast corner of S. 9, and southwest corner of 18, two sections have been accurately measured. The first is called *Burchfield No.* 1, and the second, the *Haldman Bed.* From the similarity of these sections it seems probable that they are of the same seam.

Sandstone roof

	1	2
Coal	13 inches	17 inches
Slate	3 “	2 “
Coal	9 “	9½ “
Slate	2 “	1½ “
Coal	7½ “	10 “
Slate	2½ “	½ “
Coal	15 “	12 “
Clay	22 “	36 “
Coal	19 “	18 “

Fire clay bottom

There is reason for believing that the thick seam of coal reported as occurring on Daniel's Creek, near the river, is the same as this.

In section 19 of this township 20, R. 7, W., the following measurements were made:

Surface.			
COAL	1 ft.	3 in.	
Slate	0 "	½ "	
COAL	0 "	6 "	Burchfield No. 3.
Slate	0 "	1 "	
Coal	1 "	7½ "	
Fire clay.			
Sandstone, etc.	20 ft.	4 in.	
COAL	2 "	4 "	Burchfield No. 2.
Fire clay.			

In the southeast corner of Sec. 30, same township and range, we get the following section of what has been called the Jones Bed.

Slate roof.		
COAL	0 ft.	9 in.
Slate	0 "	7 "
COAL	0 "	10 "
Fire clay	3 "	6 "
COAL	1 "	7 "
Slate	0 "	½ "
COAL	0 "	11 "
Slate	0 "	1 "
COAL	1 "	3 "

In Sec. 27 the following measurements were made of the *Hart Bed.*

Sandstone roof.		
COAL	1 ft.	8 in.
Slate	0 "	1 "
COAL	0 "	7½ "
Slate	0 "	1 "
COAL	0 "	9 "

Some distance down the branch from this outcrop, another bed has been exposed, of which the following measurements were taken:

Thomas Bed.	Sandstone roof		
	COAL	1 ft.	7½ in.
	Slate	0 "	1 "
	COAL	1 "	1 "
	Bottom		

About 15 feet below this, and separated from it by slates, is a small seam, 2–4 inches in thickness. On Brush Creek, several small seams have been observed, which lie between the beds above given and the Warrior River.

From the above given measurements the following section has been constructed, which shows approximately the relations of the seams in this vicinity.

Section of the Measures in T. 20, R. 7 and 8, Tuskaloosa County.

	Surface rocks		
(9)	COAL, Cleveland Bed (?)	2 ft.	4 in.
	Sandstones, &c	40 "	0 "
(8)	COAL. (*Jones', Hart's, Burchfield No. 3,*) 3 ft. to.	3 "	8 "
	Sandstones and other measures	20 "	0 "
(7)	COAL, (*Peterson's Burchfield No. 2,*)	2 "	4 "
	Sandstones	25 "	0 "
(6)	COAL, (*Thomas, Holdman, Burchfield No. 1,*)	6 "	6 "
	Shales and Slates	15 "	0 "
(5)	COAL	0 "	2 to 4 in.
	Sandstone, &c., (estimated)	30 "	0 "
(4)	COAL	0 "	10 "
	Sandstones, etc	150 "	9 "
(3)	COAL	0 "	3 "
	Sandstones	10 "	3 "
(2)	COAL	0 "	10 "
	Sandstones	100 (?)	0 "
(1)	COAL	0 "	4 "
	Water level, Warrior River.		

Between Daniel's and Davis' Creeks, in the immediate vicinity of the river, no coal outcrops have been observed. The country is made up chiefly of massive sandstones, and it is exceedingly broken and rugged.

Near *Mat Christian's, on the Watermelon road,* the following section was made:

COAL	1 ft.	2 in.
Dark Slate	0 "	6 "
COAL	0 "	1½ "
Dark Slate	0 "	3 "
Coal	0 "	4 "
Bottom slate.		

Near Prince Christian's, S. 14, T. 19, R. 9., W., occurs a seam of coal 14 inches in thickness. An analysis of this coal is given further on. This seam is supposed to be same as the upper seam of the Blue Creek section given below.

On Panther Branch, near its confluence with the river (S. 8, T. 19, R. 8 W.), a seam of coal has been examined which is probably the lower seam of the Blue Creek section.

From a number of examinations of coal outcroppings, near Blue Creek, in the Alexander McMillan's neighborhood, the following approximate general section of the Measures in this locality, has been constructed.

Section of the Coal Measures on Blue Creek, Tuskaloosa County, near Alexander McMillan's.

	Top—Drift Pebbles and Sands—Coarse, massive Sandstones, with ledge of Conglomorate—Massive Sandstone	30 ft.	0 in.
(2)	COAL, good, free from slate (S. 30, T. 18, R. 8, W.)	1 "	2 "
	Sandstone, partly massive, partly laminated	60 "	0 "
	Blue slaty sandstone	20 "	0 "
	Gritty slate with fossils	4 "	0 "
	Blue slate with fossils	0 "	4 "
(1)	COAL	0 "	3 "
	Slate	0 "	½ "
	COAL	0 "	2 "
	Parting	—	—
	COAL	0 "	4 "
	Parting	0 "	¼ "
	COAL	0 "	3 "
	Black slate	0 "	2 "
	Curly, bottom slate	2 "	6 "
	Coarse, massive sandstone, forming the rock of the Squaw Shoals to level of river at Crowder's Shoals	90 "	0 "

Analyses are given below of the coals from both these seams, samples taken from several localities.

	1	2	3	4
Specific Gravity	1.280	1.317	1.329	1.282
Sulphur	.801	.608	.835	.798
Moisture	2.514	2.179	.778	2.391
Volatile Matter	32.093	32.855	33.271	33.865
Fixed Carbon	61.886	59.820	61.082	59.069
Ash	3.507	5.146	4.869	4.675
	100.000	100.000	100.000	100.000

No. 1. from S. 30, T. 18, R. 8, W., upper seam (2) of section given above.

No. 2 from S. 14, T. 19, R. 9, W., Prince Christian's, upper seam (2) of section given above.

No. 3 from S. 8, T. 19, R. 8, W., Panther Branch, lower seam (1) of section given above.

No. 4 from S. 32, T. 18, R. 8, W., Alex. McMillam's lower seam (1) of section given above.

Section 2. *From the foot of Sguaw Shoals to the Mulberry and Locust Fork of the Black Warrior.*

Distance 21.5 *miles—Difference of Elevation* 53 *feet.*

The coal beds that would be made accessible along this section of the river are described in the following details:

On the eastern side of the river, along Indian and White Oak Creeks, in sections 25 and 36 of Township 18, Range 8, West, three seams are known of which the subjoined measurements have been made.

Section on Lick Branch of Indian Creek.

Slaty sandstone roof.

COAL, cubical blocks	1 ft.	1 in.
Slate	4 "	6 "
COAL	0 "	3 "
State	0 "	6 "
COAL	1 "	0 "

Slate bottom.

275 feet above this seam is another seam in Farley's Spring the thickness of which is 12 inches.

On a branch of White Oak Creek, are outcrops of coal shows the following section.

	ft.	in.
Gritty, fossiliferous slate	1	0
Coal	0	1
Slate	0	¼
Coal	0	4
Parting.		
Coal	0	4
Slate	0	¼
Coal	0	1
Slate	0	2
Coal	0	1½
Bottom slate	0	6

Curly slaty sandstone with fossils at bottom of outcrop. Forty or fifty feet below this, in the bed of White Oak Creek, there is another seam from which coal has been mined.

From the above we get the following:

General Section of the Coal Measures on Indian Creek and Vicinity.

		ft.	in.	
	Coal Measures with Capping of Pebbles	75	0	
(3)	Coal (Farley's Springs)	1	0	
	Measures (Sandstones, &c.)	225	0	
(2)	Coal, (on branch of White Oak Creek)	1	1½	
	Sandstones, etc	40–50	0	
(1)	Coal (on Lick Branch and White Oak Creek),			
	Upper Bench	1	1	2 ft. 4 in.
	Lower Bench	1	3	

Near the river on the northwestern side, no coal outcrops have been observed between Blue Creek and Short Creek, a distance of twelve or fifteen miles.

On the opposite side, in sections 2 and 13 of township 18, R. 7, W., and in S. 36, T. 17, R. 7, W., and in S. 30, T. 17, R. 6, W., are out crops of a very good seam of coal which has been worked and the coal boated down to Mobile.

A few sections will give a correct idea of the character of this seam.

Section in S. 35, *T.* 17, *R.* 7, *W., Heard's Shoals.*

Blue gritty slate roof with fossils.

COAL, good cubical blocks	0 ft.	4 in.
Clay slate, surface stained with iron oxide containing iron concretions	0 “	10 “
COAL	0 “	6 “
Mother of coal parting	0 “	¼“
COAL	0 “	5 “
Mother of coal parting	0 “	¼“
COAL as for as seen, (bottom not reached)	1 “	0 “

On *Cedar Branch*, S. 13, T. 18, R. 7, W., we have the following section:

Slaty sandstone roof.

COAL, good, cubical blocks	0 “	9 “
Slate	1 “	0 “
COAL, good, bottom not seen, (reported	2 “	0 “

In *Coal Cave Hollow*, S. 3, T. 17, R. 6, W., the section is as follows:

Slaty sandstone, with several hard layers	20 ft.	0 “
Blue gritty slate with fossils	1 “	6 “
COAL, good, cubical blocks	0 “	4 “
Dark clay slate	0 “	6 “
COAL, good, containing near tops ¼ inch. of pyrites.	0 “	10 “
Slate parting, with flakes of pyrites	0 “	¼ “
COAL, good, rather soft	0 “	4 “
Mother of coal parting	0 “	¼“
COAL, good, bottom not seen (reported)	2 “	0 “

On Valley Creek near the Weaver Mill in S. 36, T. 17, R. 7, W., are the old Frierson Coal Mines, at which mining has been conducted in a systematic way, and upon a large scale. The coal was all boated down the river during the winter months.

This seam has the following composition as shown by the subjoined analysis of a sample from *Coal Cave Hollow.* Probably the seams at Heard's Shoals, on Cedar Branch and at the Frierson Works are same as this.

Coal Cave Hollow.

Specific Gravity	1.330
Sulphur	1.945

Moisture	1.258
Volatile Matter	26.253
Fixed Carbon	59.896
Ash	12.594
	100.000

This brings us to the vicinity of the Fork Shoals, where many outcrops of coal have been observed and measured.

On the northwestern side of the river, in sections 23, 24, 25 and 26, in T. 17, R. 7, W., on Short and Friley's Creeks, three seams are known, of which I give the sections below. The two lower seams are separated by 15 feet of slates and sandstones. One of these is probably the same as that measured at Heard's Shoals, Coal Cave Hollow, &c., above. The upper seam is separated from the lower ones by 100 feet or more of sandstones.

On Short Creek near the river, in the N. E. ¼ of N. W. ¼ of S. 26, T. 17, R. 7, W., on Mrs. Robinson's land, the two lower seams are exposed and afford the following sections:

	Top slaty sandstone.		
	Hard, compact, sandstone	0 ft.	10 in.
	Slaty sandstone, bluish below	10 "	0 "
	Bluish gritty slate	1 "	0 "
(2)	COAL, variable in thickness	0 "	3 to 22 in.
	Fossiliferous slate, with Sigillaria	2 "	0 in.
	Dark slaty sandstone, micaceous	12 "	0 "
(1)	COAL, at Level of Warrior River	1 "	10 "

On Friley's Creek, near the river, S. W. ¼ of N. W. ¼ of of S. 24, T. 17, R. 7, W., on John Richardson's land, one of these lower seams gives the following section:

Gray sandstone, part massive, part laminated, some, with false bedding—at least	20	ft.	0	in.
Coal, good	0	"	4½	"
Hard, compact slate	0	"	8	"
Coal, good	1	"	1½	"
Hard, compact slate, with Sigillaria	1	"	0	"
Slaty Sandstone				

The same seam exposed on Thomas' land, near by, in S. E. corner of S. 23, T. 17, R. 7, W., was measured, with the following results:

Slaty Sandstone top.				
Coal	0	ft.	5	in.
Hard, blue colored slate	1	"	4	"
Coal	1	"	6	"
Hard bottom slate.				

Near Asbury Snow's spring, in the immediate vicinity of the Fork Shoals, the following measurements were taken, probably of the same seam:

Coal	0	ft.	4	in.
Slate	0	"	4	"
Coal, as far as seen	1	"	9	"

Analyses of the coal from this seam show the following composition:

	1	2	3
Specific Gravity	1.268	1.280	1.336
Sulphur	1.131	1.506	.722
Moisture	1.475	1.442	3.560
Volatile Matter	34.271	27.211	26.566
Fixed Carbon	59.128	66.000	64.288
Ash	5.126	5.347	5.646
	100.000	100.000	100.000

No. 1, From John Richardson's land on Friley's Creek, locality given above.

No. 2, From Thomas' land on Friley's Creek, locality given above.

No. 3, From Mrs. Robinson's lower bed, N. E. corner of N. W. ¼ of S. 26, T. 17, R. 7, W.

The lowest of the three seams mentioned is exposed below the water level in the river at the Fork Shoals, from which place it has been raised and boated down the river to Mobile. The uppermost of the three seams has a thickness varying from fifteen to twenty-two inches, as will be seen from the subjoined measurements. It is exposed in many places, at an average height of 100 to 125 feet above the level of Warrior River.

At the Fork Shoals, this seam is exposed in the Bluff, on the eastern bank of the river, where the following measurements were taken :

Laminated Sandstone	20	ft.	0	in.
Coal, good, red on joint surfaces	0	"	3	"
Soft Slate	0	"	1¼	"
Coal, with cubical fracture, red on surface	1	"	6	"
Slaty Sandstone.				

Near John Richardson's house in N. W. of N. E. of S. 24, T 17, R 7, W., this seam has been measured in two places, with the following results:

Flaggy Sandstones	10	ft.	0	in.
Slaty	3	"	0	"
Coal, cubical blocks	0	"	4	"
Fossiliferous Slate	0	"	2	"
Coal	1	"	6	"
Bottom slate.				

Slaty Sandstone top.				
Gritty slate	1	ft,	0	in.
Coal	0	"	2	"
Slate	0	"	3	"
Coal, red joint surfaces	1	"	7	"
Slaty sandstone bottom.				

In this immediate vicinity, near Mrs. Taylor's house, the same seam outcrops, and exhibits similar characters to those above given.

On Short Creek (S. W. ¼ S. 23, T. 17, R. 7,) on Mrs. Robinson's land, upper bed, at an elevation of 135 feet above the level of the river, a section, probably of this same seam, was made, with the following results:

Blue, gritty slate above.		
COAL, red and rusty in color on surface	0 ft.	11 in.
Slate	0 "	5½ "
COAL, very red on surface	0 "	3 "
Bottom, slate, as far as seen.		

The character of the coal from this seam may be seen from the following analyses made from samples taken from the outcrop at the Fork Shoals (No. 1), and near Mr. John Richardson's house (No. 2).

	No. 1	No. 2
Specific Gravity	1.325	1.310
Sulphur	.793	1.076
Moisture	4.976	1.398
Volatile Matter	27.169	30.647
Fixed Carbon	62.135	62.183
Ash	5.720	5.772
	100.000	100.000

From these data a section of the Coal Measures in the vicinity of the Fork Shoals has been constructed, to show more clearly the relative position of these seams:

Section of the Coal Measures near Fork Shoals:

	Laminated Sandstone	20 ft.	0 in.
(3)	COAL, upper seam	2 "	0 "
	Slaty Sandstones, sometimes laminated, becoming massive in places	100 "	0 "
	Bluish gritty slate	1 "	0 "
(2)	COAL, variable thickness 3 in. to	1 "	10 "
	Fossiliferous slate, with Sigillaria	2 "	0 "
	Dark, slaty sandstone, micaceous	12 "	0 "
(1)	COAL, at bed of river 1 ft. 10 in. to	2 "	0 "

Seam No. 1 is seen at Richardson's, on Friley's Creek; on Thomas' land, at Asbury Snow's spring; at Mrs. Robinson's, (together with No. 2), and in the river at the Fork. No. 3 outcrops in the Bluff, at the Fork, near Mrs. Taylor's house, near John Richardson's, and on Mrs. Robinson's land on Short Creek

In this connection may with propriety be noticed occurrences of coal on Valley Creek, near Toadvine, S. 10, T. 18, R. 6, W., and in Sec. 11 of same township and range. Coal is found here in the bed of Valley Creek for a distance of two miles, and it appears there are two distinct seams, the upper one being of better quality, and reported to be about three feet in thickness. Before the construction of railroads through parts of the Coal Measures, many boat loads of coal were raised from these seams, and floated down to Mobile. With a navigable river below, these beds will doubtless again be extensively worked.

I shall also here speak of two occurrences of coal on the Little River (although they lie outside of the region of the present survey) for the reason that one (on Coal Creek) will be easily reached, whenever the Fork Shoals are made navigable; and the other (at Calvary Williams'), whilst it may not be made directly available by the improvement of the Warrior River, will doubtless be mined and floated, in high water, down the Little River to the Fork, if indeed the Little River itself should not be improved for the purpose of reaching this valuable seam

Coal Creek is well known in this locality from the circumstance that coal is exposed in the bed of the Creek almost continuously, from near its mouth to the head waters, a distance of three miles or more. It seems probable that there are three seams, but from lack of an opportunity of getting a full section of the lowermost outcrop, we can be certain of only two. Within a quarter of a mile of the mouth of the creek is the first outcrop. The upper part of this seam (1 foot thick as far as seen) appears in the bed of the Creek in several places. The coal is bright and hard. Near the south line of S. 26, T. 16, R. 6, W., a second bed is exposed of which the following section was obtained:

Sandstone roof.

COAL	1	foot	0	inches
Clay parting	0	"	¾	"
COAL	2	"	6	"

Sandstone bottom.

An average sample of this coal shows the following composition :

Specific gravity	1.351
Sulphur	1.525
Moisture	1.850
Volatile matter	27.561
Fixed carbon	61.696
Ash	8.893
	100.000

Near the Landtrip old place, near the head waters of the Creek, another seam is exposed, the lower part of which could not be seen. The section, as far as could be made, was as follows :

Sandstone roof.

COAL	0	feet	7	inches
Slate	0	"	¾	"
COAL	0	"	4	"
Slate	0	"	½	"
COAL, bottom not seen, visible	2	"	0	"

This coal is also of good quality and the seam is said to be over three feet in thickness

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At the mouth of the Village Creek, on land belonging to Calvary Williams, in S. 28, T. 16, R. 5, W., and in northeast quarter of section 33, there is an outcrop of coal of exceptional thickness. The measurements given below show the character and extent of these beds, which are distributed in two groups

Shale roof.

UPPER GROUP.	Coal (4)	1	foot	3	in.	
	Clay	0	"	2	"	
	Coal (3)	0	"	4	"	
	Slate	0	"	3½	"	
	Coal (2)	2	"	3	"	
	Slate	0	"	10	"	
	Coal (4)	4	"	0	"	1 ft. 6 in. showing above water level.
	Gritty slates	10	"	0	"	

LOWER GROUP. COAL, main bench, 5 to 6 feet.

The analyses which follow of average samples of the coal from the lowest seam of the Upper Group (No. 1), and from the main bench of the Lower Group (No. 2), show the composition of this coal:

	No. 1	No. 2
Specific gravity	1.391	1.312
Sulphur	.521	.604
Moisture	4.175	1.525
Volatile matter	22.415	26.170
Fixed carbon	62.482	66.020
Ash	10.928	6.285
	100.000	100.000

The lower or main bench appears to be quite free from shale or slate; it is hard and does not crumble upon exposure to the weather, cakes very little when heated, making it probable that it can be used raw in the furnace. The coal from the upper series of beds is also a firm coal which, though exposed for years upon the bank of the river, has not crumbled perceptibly.

The strike of the measures here is N. 25° E. and dip S 65° E. at the rate of 3½°.

It is not yet ascertained where these seams belong in the general section of the Basin, nor over what extent of country they are to be found, nor to what distance (beyond a mile or two) the beds retain their exceptional thickness.

Section 3. *From the Locust and Mulberry Fork of the Black Warrior, to the Fork of the Sipsey and Mulberry at Old Warrior Town. Distance* 47.75 *miles. Difference of elevation* 50 *feet.*

The material advantages to be gained by opening this part of the river, are presented roughly in the following details, by which it will be seen that whilst the fall and consequently the difficulties to be overcome, are slight, the length of navigable river gained would be about half that embraced in the present survey, and the number and value of the Coal seams thus made accessible, will in no way fall below those already described.

Above the Fork Shoals to the mouth of Lost Creek, appear to be few outcrops of coal, except where in the vicinity of Dr. Snow's landing, one of the Lower, and near Mr. John Richardson's and Mrs. Taylor's houses, the Upper of the Fork Shoals seams described above, are found in most of the branches flowing into the river.

On the eastern side of the river, coal is rare near the Fork. It is a noticeable fact that whilst on Coal Creek, the water runs for two or three miles over coal beds, on Prescotts', which is the next creek, flowing into the river only a few miles above Coal Creek, there is no known occurrence of coal.

Between Wilmington P. O., in S. W. of S. 1, T. 17, R. 7, W., and Lost Creek, there is a high ridge elevated 425 to 450 feet above the river level. This ridge divides the waters of Lost Creek from those of Friley's and Shoal Creeks flowing into the Warrior below the Fork. This ridge is noticeable for having in same parts, a capping of pebbles of Orange Sand or Straitfied Drift age.

In the vicinity of Lost Creek, between the Warrior River and Wolf Creek, a seam of coal has been examined in numerous localities and the fact of its occurrence for several miles along the river has been established.

Thus, on Falls Branch, near the ford of the Jonesboro road, in S. 22, T. 16, R. 7, W., the following section was obtained:

Slaty sandstone.		
COAL, good, hard	1 ft.	0 in.
Black shale	0 "	3 "
COAL	0 "	3 "
Dark gray slate	0 "	6 "
COAL, soft, bony	1 "	0 "
Hard slate bottom.		

Above this bed there are at least 100 feet of thinly laminated sandstone, with some ledges of heavy-bedded rock. The dip of the rocks where the above section was made is S. 25° or 30° E., rate of dip 2½°, but this is probably on account of an undulation in the strata, since the prevailing dip is west.

Below the ford, on the bank of Lost Creek, is a shaft, from which some coal was raised years ago.

On Fanny's Branch, which empties into Lost Creek, near its mouth, the same seam may be seen in several places, e g. in S. W. corner of N. E. quarter of S. 23, T. 16, R. 7. W., and higher up near the middle of N. & S. line, between the N. E. & N. W. quarters of S. 23. The dip here also is S. 25° or 30° E., and rate of dip 3.°

On the east side of the river, near the S. W. corner of S. 26. T. 16, R. 7, W., in the Brake bend, the same coal is exposed in a small branch, a quarter of a mile from the river. As will be seen by the sections below, the seam is the same as that on Fanny's and Falls' Branches. though thicker and better.

Section on East side of River, just above mouth of Lost Creek.

Bluish, slaty sandstone roof.				
COAL, good hard	1	ft.	0	in.
Black shale	0	"	2	"
COAL, good	0	"	8	"
Slate parting	0	"	¼	"
COAL	0	"	1½	"
Parting	0	"	⅛	"
COAL, good	0	"	8	"
Soft, whitish clay slate	0	"	2	"
COAL, soft	0	"	1½	"
Slate	0	"	2½	"
COAL, good	0	"	1½	"
Bottom, slate, with fossils, as far as seen.	1	"	0	"

In the upper part of the Brake bend and near foot of the Franklin shoals, S. 30, T. 16, R. 6, W., the same seam was measured again, with the following results :

Gritty Slate and Sandstone roof		
COAL, good, hard	0 ft.	8 in.
Black shale,	0 "	1½ "
COAL, good	0 "	4 "
Parting slrte	0 "	¾ "
COAL.	0 "	4 "
Parting slate	0 "	1 "
COAL	0 "	11 "
Grayish, hard slate, with fossils, as far as seen	0 "	10 "

By comparison of these sections, it will be seen that the seam varies much in thickness, and in quality of the coal and amount of slate. In some localities it could be worked with profit. On the west side of the river, the seam has been regularly mined, at the Van Hoose mine, where it is elevated at least 25 feet above the water level.

The analysis given below of this coal, from Brake Bend, S. 24, T. 16, R. 7, W., will show its character :

Specific gravity	1.339
Sulphur	1.105
Moisture	4.535
Volatile matter	26.407
Fixed Cardon	56.890
Ash	12.168
	100.000

In the bank of that part of the river running between the Franklin and the Payne bends, in the S. W. quarter of S. 19, T. 16, R. 6, there is a stratum of dark-colored fossiliferous limestone, at least three feet in thickness; this rock is known also at the mouth of Bluff creek, opposite Thompson Bend. So far as the writer knows, this is the first occurrence yet announced of limestone in the Alabama Coal Measures.

A Section of Measures at Franklin's Bend is

Stratified sandstone—top of bluff	100 ft.
Dark, fossiliferous limestone, at least	3 "
Measures, sandstones, &c	12 "
COAL, thickness not ascertained	
Sandstone and other measures	20 "
COAL, at surface of water in river, thickness not ascertained	

The seam, of which sections were given above, occurring near the mouth of Lost Creek, and in Brake Plantation, is probably *one* of the above section.

At this point I shall make a slight digression, for the purpose of describing certain occurrences of coal at a distance from the river, and principally along the course of Lost Creek. With the opening of the river, by means of locks and dams, all these coal localities upon Lost Creek and its tributaries, will be easily accessible.

In the southwestern part of T. 15, R. 7, W., upon tributaries of Baker's Creek and Lost Creek, a very good seam of coal has been exposed. The following measured section will show the character of the seam.

On Mrs. Bailey's land, S. E. of S. E. of S. 20, T. 15, R. 7, W., on a branch of Bryant's Creek, the seam is as given below:

Massive sandstone	6	ft.	0	in.
Slaty roof	8	"	0	"
COAL, good	1	"	6	"
Black shale	0	"	1½	"
COAL, bony	0	"	9	"
Parting	0	"	¼	"
COAL, good	0	"	3	"
" bony	0	"	4¼	"
Slate bottom.				

The bony part of this outcrop is worse than the same part of the seam at any of the other localities visited.

In the other localities, it was found impossible to get complete measured sections of the outcrops; the thickness of the seam varied from three to three and a half feet, as given below. In Nick Key's field, on Double Falls Branch, S. 34, T. 15, R 7, the thickness is about three feet, the coal of a better quality than that at Mrs. Bailey's; it works well in shops, and stands shipment and the weather without crumbling.

In S. W. corner of S. 26, T. 15, R. 7, on Tom Bradley's land, the same seam outcrops on Helm,s prong of Baker's Creek; thickness about 3 feet 6 inches. The coal is hard and bright, and has been much used as a shop coal, for which purpose it is well suited. In sections 34 and 35, adjoining, the same coal is known, so also, in S. 26, near Mt. Zion church and school-house spring. At this latter place the coal is somewhat too bony, and is not considered so good. In the southeast corner of S. 23, near the site of the Burnt Meeting House, on John Garner's land, the same seam may again be seen; from this locality the coal enjoys a fine reputation as a smith's coal.

The subjoined analyses exhibit the character of the coal:

	1	2	3
Specific Gravity	1.278	1.339	1.416
Sulphur	0.690	0.603	1.236
Moisture	2.702	5.715	1.533
Volatile Matter	29.564	28.095	30.405
Fixed Carbon	64.818	62.612	51.962
Ash	2.916	3.578	16.100
	100.000	100.000	100.000

No. 1. Hard, lustrous coal free from smut—Tom Bradley's.

No. 2. Better part, but dull, friable from long exposure—Mrs. Bailey's.

No. 3. Bony part—Mrs. Bailey's.

These are all outcrops of probably the same seam. It has many points of resemblance to the Mt. Carmel seam to be described below. It is hard and bright, and will stand storing and shipping.

At Lost Creek, at the crossing of the Old Baltimore Road, near Williams' Mill, the following section of the strata has been obtained, which will explain the relations of the several coal seams in this vicinity.

Section on Old Baltimore Road, near Williams' Mill on Lost Creek.

Slaty Sandstone, top of hill
(3) Coal, thickness not known.

	Flaggy sandstones	25	feet.		
(2)	COAL, bony at top, hard and bright	3	"	6	inches.
	Flaggy sandstones	30	"	0	"
	Heavy bedded sandstones	2	"	0	"
	Flaggy sandstones	5	"	0	"
	Heavy bedded sandstones	30	"	0	"
(1)	COAL	0	"	6	"
	Slaty sandstones to water level	3	"	0	"

The coal No. 3 was seen only in dirty outcrops along the road in several places. Coal No, 2 is seen in a small ravine near the Old Baltimore Road, one hundred yards or more south of the mill. It is hard and somewhat bony at top, resembling, in many respects, the coal in the seam described above as outcropping at Tom Bradley's, Mrs. Bailey's and other localities. The coal No. 1 is a thin seam between sandstones and exposed near the water level at the mill.

On the west side of Lost Creek, near the Baltimore ford, and in the fork between Cane and Lost Creeks, on Mr. David Cobb's land, coal has been taken in large quantities from the bed of Cane Creek. This is in the S. W. corner of S. E. "Forty" of the N. W. ¼ of S. 5, T. 16, R. 7, W. It is a very hard, bright coal, with sufficient bony coal to make it a fine stocking coal, but not enough to injure it as a fuel. The thickness could not be measured, as the bed was below the water level in Cane Creek, the coal, however, has many points of resemblance to the Bradley coal on the opposite side of the creek.

An analysis of this coal shows the following composition in 100 parts:

Specific Gravity	1.310
Sulphur	.728
Moisture	2.261
Volatile Matter	33.782
Fixed Carbon	57.002
Ash	6.955
	100.000

A bright, clean laminated coal, breaking into regular fragments.

Higher up Lost Creek, at Holly Grove, there are two seams, with about 20 feet of slaty sandstone between them.

Section in Holly Grove Neighborhood:

	Slaty sandstones		
(2)	COAL, about	1 ft.	0 in.
	Slaty sandstones	20 "	0 "
(1)	Coal	2 "	6 "
	Slate.		

The coal No. 1 was examined at several localities on Lost Creek.

At Guttery's Cave Hole we get the following section:

Sandstone ledge.		
Bluish, gritty slate—the lower foot or two more clayey and with fossils and nodules of clay ironstones	1 ft.	0 in.
COAL, rather bony	0 "	3 "
COAL, hard, brighter	2 "	1 "
Slate bottom.		

This is in N. E. ¼ of S. 18, T. 14, R. 8, W., and the same seam is exposed everywhere along the banks of the creek in this vicinity.

An average sample of the coal from the locality above given, was analyzed with the following result:

Specific Gravity	1.365
Sulphur	.687
Moisture	3.332
Volatile Matter	30.683
Fixed Carbon	52.762
Ash	13.223
	1.00.000

The upper thin bed was not particularly examined.

A few miles east of Holly Grove, on the Jasper Road, the following section of the Measures was made.

Section 8½ miles W. of Jasper near Lost Creek.

	Slaty sandstone	15 ft.	0 in.
(3)	COAL, approximated	1 "	6 "

	Gritty slate with clay ironstone	20 ft.	0 in.
(2)	**Coal**	2 "	0 "
	Under clay	2 "	0 "
	Gritty slate with clay ironstone	3 "	0 "
(1)	Coal	0 "	6 "
	Siliceous curly slate	2 "	6 "

No opportunity presented itself for examining in detail either of these seams; but on Lost Creek, just below the mouth of Burton's Creek, near center of S. 19, T. 14, R. 8, W., a mile or more from the locality just given above—is a well known coal bed called the *Baker Bed.* This bed lies below the water level in the creek and it was not possible to get a measurement, but a large amount of good coal has been raised here. Near this is another seam about twenty inches thick and the following measurements will show the relations between the two.

Section of Baker Beds on Lost Creek, below Mouth of Burton's Creek, Walker Co.

	Slaty sandstones, with hard ledges	2 ft.	0 in.
	Clay slates, roof	1 "	3 "
(2)	**Coal**, bony on top, good below	1 "	8 "
	Fire clay	0 "	2 "
	Gritty slate	2 "	0 "
	Slaty sandstone with hard ledges	7 "	0 "
(1)	**Coal**, good, hard, in bed of creek, reported to be	3 "	0 "

The following analyses made from specimens of the lower bed and from an *average sample* of the upper bed will show the character of the coal:

No. 1. Sample from Baker's upper bed—Lost Cr. Walker Co.
No. 2. Specimen " " lower " " " " "

	1	2
Specific Gravity	1.324	1.285
Sulphur	0.695	1.331
Moisture	6.355	2.578
Volatile Matter	31.086	35,164
Fixed Carbon	60.665	59.348
Ash	1,894	2.910
	100.000	100.000

No. 1 shows a considerable amount of weathering, still both these coals show excellent qualities; they are both hard and compact, and will stand any amount of handling, and at the same time the percentage of ash is quite small in each case. Near the head waters of Burton's Creek, which flows into Lost Creek in this vicinity, is a thick seam of coal, known as the *Townley Bed.* Its outcrops occur in several places in S. 34, T. 13, R. 8, W. The bed varies considerably in thickness, so that it is at present hardly possible to give the average. The following section was made from actual measurements, not at the thickest place:

Section of the Townley bed.

		ft.	in.
	Slaty sandstone	10	0
	Blue clay slate with many fossils	2	0
	Soft parting shales	0	1
Upper Bench	Bony coal	0	2
	COAL, good but somewhat bony	1	4
	Mother of coal parting	0	½
	COAL, good, best below	2	2
	Hard black clay slate, with fossils	0	11
Lower Bench	COAL, best in bed	2	0
	Black fossiliferous slate	2	0

I present here two analyses of coal from this bed: No. 1, from above the hard black clay slate, and No. 2, from below it. If only the lower part of the upper bench, just above the clay slate, were mined, it would be much better, the analysis is made from coal from the whole thickness.

	1	2
Specific Gravity	1.450	1.310
Sulphur	1.744	0.710
Moisture	2.960	3.007
Volatile Matter	26.162	29.084
Fixed Carbon	44.516	63.352
Ash	26.362	4.557
	100.000	100.000

For local use, only the lower bench, No. 2, has been much mined, and this, the analysis shows to be an excellent coal.

Higher up Lost Creek and on the upper waters of Mill

Creek, an eastern tributary of Lost Creek, are several coal beds of which I am able to give an approximate general section.

Thus, near Kansas post-office and on Tim Burton's land on the banks of Lost Creek, near the southeast corner of S. 30, T. 13, R. 9, W., there are three distinct beds whose relations are shown in the following general section:

Approximate Section of the Coal Measures near Kansas Post-office Walker County.

	Sandstone, &c.	17 ft.	0 in.
(3)	COAL, cut in Burton's well	4 "	6 "
	Heavy bedded sandstone, &c.	60 "	0 "
(2)	COAL very good 1 ft. to	1 "	6 "
	Slaty sandstone	10 "	0 "
(1)	COAL, good, in bed of Lost Creek (reported.)	3 "	0 "

The bed No. 3 is cut in Mr. Burton's well, and whilst it is somewhat bony it is still a very fair coal. The seam is probably the same as the Jaggers bed described below. The same seam has been cut in another well half a mile from Mr. Burton's.

On Lost Creek, south of Kansas post-office, coal is found in the bed of the creek for a distance of a mile or more. This coal has the reputation of being a fine shop coal, and from its appearance, this reputation is well deserved. A thorough examination of this bed could not be made for the reason that it lies mostly below the water level.

Specimens from this lowest seam, No. 1 of above section, have been analyzed with the following resutl:

Specific Gravity	1.315
Sulphur	.586
Moisture	2.606
Volatile Matter	34.110
Fixed Carbon	56.628
Ash	6.656
	100.000

About 10 feet above this bed, and separated from it by slaty sandstones, is another coal seam. This bed, No. 2 of above section, being thin, was not sampled for analysis, but a section was made of the enclosing rocks as follows:

Section of bed (2) on Lost Creek, near Kansas Post-office, Walker County.

Whitish slaty sandstones.		
Black slate	0 ft.	1 in.
COAL, very good	1 "	0 "
Clay slate bottom	2 "	0 "

On Dr. Miller's land, near the center of S. 33, T. 13, R. 9, W., a seam of coal reported to be two feet in thickness has been opened and worked to some extent. The coal is good—splits easily.

On Mill Creek, just below the mouth of Jagger's Creek, near Miller's Mill, a seam of coal makes its appearance in the bed of the creek. This seam is at least 18 inches thick, and is very favorably known as a coal suitable for blacksmithing.

Above this bed lie 60 feet or more of tolerably heavy-bedded sandstones, and over these another seam, known to fame as the Jaggers seam. This Jagger's seam is exposed in the branches on both sides of Mill Creek and at about an elevation of 60 feet, above the same. It was measured at the school house on Jagger's Creek, S. 11, T. 13, R. 10, W. with following result:

Section of Jaggers Coal.

Whitish slaty sandstone roof.		
Fire clay	0 ft.	2 in.
Soft, black bituminous shale	0 "	7 "
Bituminous shale, whitish when exposed	0 "	6 "
Bony coal bad	0 "	9 "
Parting	0 "	¼ "
Bony coal	1 "	0 "
Parting	0 "	¼ "
COAL, somewhat bony but fair	1 "	8 "
COAL, good	0 "	7 "
COAL, bony	0 "	2 "
Black cooly shale	0 "	2 "
Sandstone with irregular surface.		

This coal bed undulates considerably, and it is sometimes entirely above the level of the water in the branch and sometimes below it; for this reason, probably, the most exaggerated statements have often been made about the thickness of this bed. The measurements above given, however, are correct.

The following analysis will show the character of the better part of the coal from this seam :

Specific Gravity	1.233
Sulphur	.574
Moisture	3.091
Volatie Matter	29.044
Fixed Carbon	56.537
Ash	11.328
	100.000

To return to the river. Along Baker's Creek and the river near its mouth, the coal seam described at Tom Bradley's is exposed in several localities, but the next well known locality for coal extends from near the mouth of Burnt Cane Cr., in Shepard's Bend, up the river to beyond the mouth of Big Cane Creek. In all this region, on both sides of the river, there are several seams of coal easily accessible. In many places the lower seam has been extensively worked. The relations of these seams may be seen from the following considerations. Near Mr. Wm. Davis', S. 15, T. 15, R. 6, W., at depth of 32 feet from the surface, a seam of coal 2½ ft. thick was cut in his well. In the lower part of his plantation, and 50 to 60 feet above water level in the river, there is another seam; and at or below the water level in this whole neighborhood is still another, so that there are at least two seams, and if that in Davis' well and in the lower part of his plantation are not the same, there are three. I shall not attempt to give the stratigraphical relation of the seams to be described below, for the reason that sufficient examinations have not yet been made to give certainty on these points. I shall therefore describe the occurrences of coal, with the remark that they are probably to be referred to two, or at most three horizons.

On Burnt Cane Creek, in S. W. corner of S. 25, T. 15, R. 6, W., on Alex. M. Stevens' land, a thick seam gives the following section :

Section of Beechy Hollow Seam.

Coal, good	0 ft. 8 in.	Upper B., 3 ft. 5½ in.
Parting	0 " ¼ "	
Coal, good	0 " 3½ "	
Parting		
Coal, good	1 " 7½ "	
Black slate	0 " ¾ "	
Coal	0 " 6 "	
Slate	0 " 2 "	
Coal	0 " 1½ "	
Slate	0 " 9 "	
Coal	0 " 6 "	Lower B., 1 ft. 4 in.
Bony Coal	0 " 1 "	
Coal	0 " 9 "	

An analysis of an average sample, much weathered, including coal from both benches of this seam, shows the following composition in 100 parts :

Specific gravity	1.439
Sulphur	.527
Moisture	6.952
Volatile matter	27.065
Fixed carbon	55.640
Ash	10.343
	100.000

In S. 30, T. 15, R. 5, near Shulough P. O., an outcrop was examined of a coal seam apparently considerably higher than the Beechy Hollow Seam.

The section is as follows :

Heavy bedded sandstone roof.
Coal, excellent........................ 1 ft. 8 in.
Slate bottom.

In the Jasper road near Shulough, by reason of an anticlinal fold in the strata, this seam outcrops in two places.

On Horse Creek, near its mouth, upper part of S. 26, T. 15, R. 6, are two seams separated by about 25 feet of strata. It may be that these two outcrops belong to the *same* seam, being displaced by a fold in the rocks; the analyses show a very close resemblance in the quality of the coal. The lower bed lies below the water level in Horse Creek; it has been much worked before the war, and was shipped to Mobile; at present the bed is entirely hidden from sight by rubbish. From some of the piles which have been lying exposed for 15 or 20 years, I selected samples for analysis which gave the following result:

Coal from the Bed of Horse Creek.

Specific gravity	1.365
Sulphur	.711
Moisture	1.848
Volatile matter	28.365
Fixed carbon	58.213
Ash	11.574
	100.000

On a little tributary of Horse Creek, and 25 feet in elevation above the preceding, is the Robinson Bed which was measured.

Section of Robinson Bed, on Horse Creek, Walker Co.

Bluish slaty sandstone	15 ft.	0 in.
Blue clay slate with fossils	1 "	6 "
COAL, good, a little bony on top	1 "	0 "
Black slate parting	0 "	1/8 "
COAL, good, hard, bright	0 "	10 "
Bluish slate parting	0 "	1/8 "
COAL, good, hard, bright	0 "	10 "
Black shale	0 "	1/2 "
COAL, good, hard	0 "	4 "
Clay slate bottom		
Measures down to Horse Creek Seam	25 "	

Analysis of two samples of Coal from Robinson's Bed, Horse Creek.

Specific gravity	1.371	1.364
Sulphur	0.580	0.599
Moisture	2.454	2.703
Volatile matter	27.007	26.600
Fixed carbon	57.650	56.367
Ash	12.989	14.330
	100.000	100.000

Higher up the river, near the mouth of Flat Creek, on Squire Jas. W. Davis' farm, one of these seams is again exposed, of which we get the following:

Section on Flat Creek, J. W. Davis'.

Slaty sandstones.	
Clay slate with fossil plants	2 ft.
COAL, all good and hard	2 "

An analysis of the upper 8 inches of this coal gives the following result:

Specific gravity	1.362
Sulphur	1.516
Moisture	1.674
Volatile matter	33.199
Fixed carbon	54.540
Ash	10.287
	100.000

At Mrs. Davis' House on Horse Creek, near the S. W. corner of S. 24, T. 15, R. 6, W., a seam of coal was cut through in a well 43 feet below the surface, and by aneroid measurements, it would seem that this bed is 40 feet above the Robinson bed on Horse Creek, so that we have the following:

Approximate General Section of Coal Measures on Horse Creek:

	Sandstone ,&c.	43 ft. 0 in.
(3)	COAL (struck in well)	3 " 6 "
	Measures	40 " 0 "
(2)	COAL, (Robinson Bed)	3 " 0 "
	Measures	25 " 0 "
(1)	COAL, (Horse Creek, Flat Creek)	2½ to 3 " 0 "

One or the other of the lower seams of the above section is laid bare in the bed of Horse Creek in numerous localities above Mrs. Davis' in sections 24 and 13.

On the opposite side of the river, the same seams occur near Davis' Ferry and Ford, and an approximate section of the measures there has been given.

On Frog Ague Creek, Big Cane Creek, and in the Baugh or Dent Bend, are outcrops of a fine seam of coal which we have called the Mt. Carmel seam. This is probably one of the lower seams of the Mrs. Davis or Horse Creek section.

The following sections will show the character of the Mt. Carmel Seam:

Section at Mt Carmel Church or Frog Ague Creek, S. 8, T. 15, R. 6, W., Walker Co.

Blue slaty sandstone	15 ft. 0 in.
Blue clay slate, with fossils	2 " 0 "
Bony COAL	0 " 1½ "
COAL, good, hard	2 " 3 "
Mother of coal, parting	0 " 1 "
COAL, good, hard	0 " 5 "
Slate	0 " ¼ "
COAL	0 " 1 "

On Big Cane Creek, in an adjoining section, is obtained the following:

Section on Big Cane Creek, S. 4, T. 15, R. 6, W., Walker Co.

Bluish slate, with many fossils, roof.	
COAL, good, very hard	2 ft. 6 in.
Parting	0 " ½ "
COAL	0 " 4 "
Black slate	1 " 0 "
Fire clay	0 " 2 "
Laminated sandstone.	

Both these sections show about 34 inches of coal. The coal is very hard and bright, and will stand any amount of handling without crumbling. From its physical properties, therefore, it is exceedingly well adapted for shipping, and the analyses show that it is a very good coal.

	1	2
Specific Gravity	1.380	1.401
Sulphur	0.586	0.482
Moisture	2.213	3.799
Volatile Matter	28.987	26.217
Fixed Carbon	56.454	57.316
Ash	12.355	12.668
	100,000	100,000

No. 1, from Mt. Carmel Church.

No. 2, from Big Cane Creek.

The similarity in the composition of these coals with those from Horse Creek, on the other side of the river, would indicate that they are from the same bed, and the physical characters of the coal point to the same conclusion. As has been already said, however, the examinations have not been extended enough to give certainty on these points.

Above the mouth of Big Cane Creek to the Sipsey Fork, are several seams, the characters of which, and their relations to each other, will be sufficiently well seen in the details below.

Near Sanders' Ferry an outcrop of coal is seen on the Old Baltimore Road, where it crosses Blackwater Creek; on the other side of the river, an outcrop, probably of the same seam, may be seen by the roadside, 30 to 40 feet above the river, and another seam occurs in all this vicinity at or near the water level of the river.

Above Sanders' Ferry, in S. W. part of S. 20, T. 14, R. 5, W., in Mrs. Burton's field, is a seam about 2 feet in thickness, about 30 feet above the water level in the river. The same seam appears also near M. D. L. Sanders', on the opposite side of the river, and also at J. M. Phillips', in N. E. of S. 3, T. 15, R. 5, W., near Democrat.

The following analysis from *Mrs. Burton's upper bed* shows the character of this coal:

Specific Gravity	1.318
Sulphur	3.070
Moisture	2.052
Volatile Matter	38.078
Fixed Carbon	55.265
Ash	4.605
	100.000

Twenty-five or thirty feet below this is another seam, known as the Phillips and Cordell, or Phillips and Camak, seam, from the two firms which have mined the coal. The Phillips and Cordell Mine is on the south side of the river, opposite Mrs. Burton's bend, in the S. W. ¼ of S. 28, T. 14, R. 5, W., upon a small branch. The same coal has also been raised from the bed of the river, near the mouth of the Branch.

The same bed is also seen in Mrs. Burton's field (Lower bed), near the river, in S. 29, and on James Macbee's land, and on land belonging to his father, both in S. 21, and lastly, perhaps, at James Cole's Spring Branch, near the Fork, in S. 16, T. 14, R. 5. At the latter place the coal resembles very much the English Cannel Coal. As the seam at this point is 40 feet above the level of the river, it may not be the same as the Phillips and Cordell.

The following analyses are from samples taken at the several localities named above:

	1	2	3
Specific Gravity	1.290	1.263	1.268
Sulphur	.649	.988	.593
Moisture	3.098	1.700	4.047
Volatile Matter	34.552	36.228	34.193
Fixed Carbon	60.745	60.591	60.698
Ash	1.605	1.481	1.062
	100.000	100.000	100.000

No. 1, from Phillips and Cordell Mine.

No. 2, from James Cole's Spring Branch.

No. 3, from E. J. Phillips', near Old Warrior Town.

By these analyses it will be seen that this coal is of very great purity, and, in some respects, superior to any yet examined along the river.

On the road from Sanders' Ferry to Democrat, near the centre of S. 4, T. 15, R. 5, W., on Jim Hawthorne's land, is a fine seam of coal which is thought to be the Pratt seam. If this surmise is correct the importance of the discovery can not well be over-estimated. The seam is near the outcrop at J. M. Phillips' mentioned above, but the Pratt seam overlies the Phillips'. The thickness of this seam is reported to be 3½ to 4 feet. Two feet of the upper part has been examined, and from samples taken the following analysis has been made:

Coal from Jim Hawthorne's (Pratt Seam ?)

Specific Gravity	1.333
Sulphur	.516
Moisture	2.969
Volatile Matter	29.784
Fixed Carbon	60.598
Ash	6.649
	100.000

No other outcrop of this seam was observed, yet it is quite probable that it will be found much nearer the river.

For the sake of comparison, I subjoin an average of the analysis of the upper and lower benches of the Pratt seam near Birmingham:

Specific Gravity	1.300
Sulphur	.918
Moisture	1.501
Volatile Matter	31.485
Fixed Carbon	61.598
Ash	5.416
	100.000

For the purpose of showing the probable relations of seams which are found near the Sipsey Fork, I subjoin the following:

Section of the Coal Measures in the vicinity of Old Warrior Town, Walker County.

Surface.		
Slaty sandstones	35 ft.	0 in.
Hard, flaggy sandstones	10 "	0 "
Slaty sandstone, compactbeneath	65 "	0 "
(3) COAL, [Jim Hawthorne's] (Pratt seam?) ... 3½ @	4 "	0 "
Flaggy sandstones	140 "	0 "
Sandstone, partly massive	55 "	0 "
(2) COAL, *Mrs. Burton's upper seam, Sanders, J. M. Phillips*	2 "	0 "
Sandstone, partly massive	30 "	0 "
(1) COAL, *Phillips & Cordell, Mrs. Burton's lower seam, Jim Cole's spring branch, Jas. Macbee's*	3 "	0 "
River level.		

In the preceding pages the general section of the Warrior Field, along the South and North R. R., and two or three analyses of coals have been reprinted from a previous report.

The convenience to the reader, and the greater completeness thus secured, will doubtless be sufficient justification for these few pages of reprint.

For convenience of reference, the coal analyses appearing above, in the body of the report, are here presented in tabular form.

TABLE SHOWING PROXIMATE COMPOSITION OF COALS—INCLUDING SULPHUR.

	LOCALITY.	ANALYST.	Specific Gravity.	Sulphur.	Moisture.	Volatile Combustible Matter.	Fixed Carbon.	Ash.
No. 1.	McLester Shaft, Tuskaloosa	H. McCalley	1.283	1.861	2.245	35.130	55.301	7.324
2.	Asylum Shaft, Tuskaloosa	" "	1.397	1.867	1.892	32.011	55.364	10.733
3.	Mrs. S. M. Chambers' Mine, Tuskaloosa Co.	" "	1.281	2.386	1.838	30.682	64.339	3.141
4.	Prude's Lower Mine, Tuscaloosa Co.	H. McCalley	1.327	0.626	5.426	31.952	59.455	3.167
5.	Goree Bed, University Seam, Tuskaloosa Co	H. McCalley	1.386	0.870	2.062	31.103	55.495	11.340
6.	University Mine, University Seam, Tuskaloosa Co.	J. B. Durrett	1.298	1.038	1.833	36.233	54.534	7.400
7.	Jim Mack's Branch, University Seam, Tuskalosa Co.	H. McCalley	1.393	0.765	7.285	28.989	54.522	9.204
8.	Manly Bed, Tuskaloosa Co	" "	1.277	0.752	2.004	33.833	61.872	2.291
9.	"Block Coal" Seam, Tuskaloosa Co.	" "	1.411	1.613	2.239	34.606	50.375	12.780
10.	Double Seam, Tuskaloosa Co	" "	1.304	2.129	1.810	34.029	58.240	5.921
11.	James Beaver's Seam, Tuskaloosa Co	J. B. Durrett	1.311	0.660	2.513	31.977	60.033	5.477
12.	"Cannel" Coal (?) near Daniel's Creek, Tuskaloosa Co.	H. McCalley	1.348	2.752	0.830	36.207	48.319	14.644
13.	Upper Seam, S. 30, T. 18, R. 8, W., Tuskaloosa Co.	J. B. Durrett	1.280	0.811	2.514	32.093	61.886	3.507
14.	Near Prince Christian's, Tuskaloosa Co.	H. McCalley	1 317	0.608	2.179	32.855	59.820	5.146
15.	On Panther Branch, Tuskaloosa Co	J. B. Durrett	1.329	8.835	0.778	33 271	61.082	4.869
16.	Near Alexander McMillan's, Tuskaloosa Co.	J. B. Durrett	1.282	0.798	2.391	33.865	59.069	4.675
17.	Coal Cave Hollow, Jefferson Co.	H. McCalley	1.330	1.945	1.258	26.253	59.869	12.593
18.	John Richardson's, on Friley's Creek, Walker Co.	J. B. Durrett	1 268	1.131	1.475	34.271	59.128	5.126
19.	Thomas' Bed, near Friley's Creek, Walker Co.	H. McCalley	1.280	1.506	1.442	27.211	66.000	5.347
20.	Mrs. Robinson's Lower Bed on Short Creek, Walker Co.	H. McCalley	1.336	0.722	3.560	26.566	64.228	5.646
21.	Upper Seam. Fork Shoals, Walker Co.	J. B. Durrett	1.325	0.793	4.976	27.169	62.135	5.720
22.	John Richardson's House, near Wilmington, Walker Co.	H. McCalley	1.310	1.076	1.398	30.647	62.183	5.772
23.	Coal Creek, Middle Bed, Jefferson Co.	" "	1.351	1.525	1.850	27.561	61.696	8.893
24.	Calvary Williams' (Upper Group), Jefferson Co.	" "	1.391	0.521	4.175	22.415	62.482	10.928
25.	" " (Lower Group), Jefferson Co.	" "	1.312	0.604	1.525	26.170	66.020	6.285

TABLE SHOWING PROXIMATE COMPOSITION OF COALS—INCLUDING SULPHUR—CONTINUED.

	LOCALITY.	ANALYST.	Specific Gravity.	Sulphur.	Moisture.	Volatile Combustible Matter.	Fixed Carbon.	Ash.
No. 26.	From Brake's Bend, Walker Co	H. McCalley	1.339	1.105	4.535	26.407	56.890	12.168
27.	From Tom Bradley's, Walker Co.	H. McCalley	1.278	0.690	2.702	29.564	64.818	2.916
28.	Mrs. Bailey's (better part), Walker Co.	H. McCalley	1.339	0.603	5.715	28.095	62.612	3.578
29.	Mrs. Bailey's (bony part), Walker Co.	J. B. Durrett	1.416	1.236	1.533	30.405	51.962	16.100
30.	David Cobb's, on Lost Creek, Walker Co.	H. McCalley	1.310	0.728	2.261	33.782	57.002	6.955
31.	From Guttery's Canoe Hole, Holly Grove, Walker Co.	J. B. Durrett	1.365	0.687	3.332	30.683	52.762	13.223
32.	Baker's Upper Bed, on Lost Creek, Walker Co	H. McCalley	1.324	0.695	6.355	31.086	60.665	1.894
33.	Baker's Lower Bed, on Lost Creek, Walker Co	" "	1.285	1.331	2.578	35.164	59.348	2.910
34.	Townley Bed, Upper Bench, Walker Co.	" "	1.450	1.744	2.960	26.162	44.516	26.362
35.	Townley Bed, Lower Bench, Walker Co.	" "	1.310	0.710	3.007	29.084	63.352	4.557
36.	Burton's, on Lost Creek, near Kansas, Walker Co.	" "	1.315	0.586	2.606	34.110	56.628	6.656
37.	Jagger's Bed, near Eldridge, Walker Co.	" "	1.233	0.574	3.091	29.044	56.537	11.328
38.	Beechy Hollow, near Shulough, Walker Co.	" "	1.437	0.527	6.952	27.065	55.640	10.343
39.	Horse Creek, near Davis' Ferry, Walker Co.	" "	1.365	0.711	1.848	28.365	58.213	11.574
40.	Robinson's Bed, on Horse Creek, near Davis' Ferry	" "	1.371	0.580	2.354	27.007	57.650	12.989
41.	" " " " " " "	J. B. Durrett	1.364	0.599	2.703	26.600	56.367	14.330
42.	Flat Creek, near Davis' Ferry, Walker Co.	H. McCalley	1.362	1.516	1.674	33.199	54.540	10.587
43.	Mt. Carmel Church, Walker Co.	H. McCalley	1.380	0.586	2.213	28.978	56.454	12.355
44.	Big Cane Creek, near River, Walker Co.	H. McCalley	1.401	0.482	3.799	26.217	57.316	12.668
45.	Mrs. Burton's Upper Bed, near old Warrior Town	J. B. Durrett	1.318	3.070	2.052	38.078	55.265	4.605
46.	Phillips & Cordell Mine, near old Warrior Town	H. McCalley	1.290	0.649	3.098	34.552	60.745	1.605
47.	James Cole's Spring Branch, near old Warrior Town	J. B. Durrett	1.263	9.988	1.700	36.228	60.591	1.481
48.	E. J. Phillips', Walker Co.	J. B. Durrett	1.268	0.593	4.047	34.193	60.698	1.062
49.	Jim Hawthorne's, near Democrat, Walker Co.	H. McCalley	1.333	0.516	2.969	29.784	60.598	6.649
50.	Pratt Seam (average), near Birmingham, Jefferson Co.	H. McCalley	1.300	0.918	1.501	31.485	61.598	5.416

TO DR. EUGENE A. SMITH,

State Geologist:

SIR—The following Report has been made in compliance with your request.

Very respectfully,

HENRY MCCALLEY.

UNIVERSITY OF ALABAMA,
February 1, 1881.

ALABAMA NORTH OF THE TENNESSEE RIVER.

GENERAL DESCRIPTION.

1. *Topography, etc.*

The Tennessee River enters Alabama near its northeast, and leaves it at its northwest corner, flowing within the limits of the State a distance of about two hundred miles.

Coming into the State by what is known in Tennessee as the Sequatchee Valley, and in Alabama as Brown's Valley, the river flows southeast along this trough, some sixty miles or more, when it is suddenly deflected from this apparently natural course, towards the northwest, and this general direction it keeps until it passes again into Tennessee at the point already mentioned.

The southernmost point of its course in Alabama, is Guntersville, where it leaves Brown's Valley, and this point is about forty miles due south of the State line.

The portion of Alabama thus embraced in this great bend of the Tennessee River, it is proposed to consider in the following pages.

Boundaries and Area.—The northernmost limit of this tract is the Tennessee State line; on all other sides the river itself forms the boundary.

The area embraced is some 3,000 square miles, or nearly 2,000,000 acres, and includes the counties of Lauderdale, Limestone and Madison, and parts of Jackson and Marshall.

Surface Configuration.—This region, though now presenting, as a rule, an extremely rugged and broken surface, was once a high plateau, gradually sloping towards the south and southwest.

Then there were no mountains and valleys, hills and dales, within its area; but it was throughout simply a high, level plain, elevated some 800 ft. to 1,500 ft. above the sea, unrelieved by the many picturesque scenes which now meet the eye as one passes over it. Though now much worn away, it still contains some of the loftiest points within the State, landmarks of a former greatness.

Divisions.—A natural division of this area is into "Highlands" and "Lowlands."

By the term, highlands, we mean the extensions into this State of the "highlands" and "table lands" of Tennessee. By the term lowlands, we mean the low, flat, rolling country between the highlands on the north and the Tennessee River on the south. The highlands have for their surface rocks, the Carboniferous and Sub-carboniferous strata, with the exception of the St. Louis or Upper Siliceous division of the latter. The lowlands have principally, for their surface rocks, the St. Louis Limestone. The highlands, as here defined, include the greater portion (nearly four-fifths) of this area. On the north, they extend entirely across the State from east to west, and in the eastern and western thirds, they extend clear through to the river on the south. The lowlands are, therefore, confined principally to the southern central portion, and are, in a measure, limited to a narrow strip, bordering upon the Tennessee; but in places this strip sends out offshoots away into the interior, in and between the hills and ridges of the highlands, thus taking in considerable tracts of country. The highlands of the western half being extension of the *highlands* of Tennessee, have, of course, the same surface rocks as these. The highlands of the eastern half, being extensions of the *table-lands* of Tennessee, are likewise similar to them. The highlands of the western half have no such thing as a mountain, whilst those of the eastern half are composed entirely of mountains, being merely the terminal ridges and spurs of the great Cumberland chain. Those on the western half usually slope gradually away to the lowlands below, whilst those of the east always end abruptly, being mountains. Those on the west, when not cut up into ravines and hollows, form a comparatively level plain, elevated some six to eight hundred feet above the level of the Gulf of Mexico; but in many places, especially near their southern edge, they are so cut up as to appear as a mere succession of ridges and hills. The highlands of the east, on the other hand, are merely broad, flat mountains, from eight to fifteen hundred feet above the sea, separated from each other by deep, narrow valleys, along which run the streams. On the west, these highlands have points extending down into the lowlands, but always connected to the main body on the north; whilst on the east many outlying, detached spurs and ridges rise up away out in the lowlands, like islands. All the rugged and broken portions of this region are due to the hard rocks of these highlands. The lowlands, in all their ramifications, are connected with the main body, bordering on the Tennessee. They are flat and rolling, with an average elevation of from five to seven hundred feet above the sea, and contain no very prominent land marks, except those formed by the rocks of the highlands.

We have thus seen that the highland and lowland areas differ as much in their general appearance as they do physically and geologically. The one is entirely different in its eastern and western portions, the other is more or less uniform throughout; the one is covered by its native forest, whilst the other, for the most part, is in a state of cultivation; and the soil of the one is poor, whilst that of the other is highly fertile.

Drainage.—Washed on three sides by the beautiful Tennesseee, and traversed every few miles, through its whole width, from north to south, by bold, rapid streams, this whole section of country is admirably drained. Its streams, with the exception of a few of the largest, all rise within its borders, and hence, are comparatively short. They are seen, especially within the highlands, winding along the deep narrow ravines and gorges, cut down into the bedded rocks, where with a great noise and a rush, they leap over the numerous cascades along their route. Before reaching the lowlands, having run over nothing but rocks and pebbles, their waters are clear and sparkling. Confined to narrow limits, bounded by steep acclivities with little or no valleys between them, and having a great fall, they are unable to spread out, and hence lakes and marshes are almost unknown. With rapid currents, these streams, during freshets, often do much damage along their banks, taking away whole crops and even the soil of the narrow bottoms which occur along them. These bottom lands are never seen, within the highlands, on both sides of the streams at once; they are always faced by bluffs, jutting up against the creek on the opposite side. The Tennessee, during high waters, often rises out of its banks along the lowlands and does much harm; its backwaters extending up the creeks for miles, sometimes almost to the margin of the highlands. These streams, with the exception of the Tennessee itself, in accordance with the general inclination of the surface, and the dip of the rocks, all flow in a southerly direction and empty their waters into the Tennessee. With many large creeks boiling up in the characteristic "big springs" of its basins and hollows, with numerous smaller springs gushing out from its hill-sides and cliffs, and with never failing wells almost everywhere to be found, this country is well blessed with the purest and best of drinking water. Not all of the springs, however, nor all of the wells, afford pure water, for in many cases the waters are of a decided mineral character, and in some instances have gained for themselves more than a State-wide reputation for their medicinal qualities.

Soils.—The soil in this region varies from a very light and poor siliceous material, in some places almost pure sand, covering the greater part of the highlands, to a very dark and rich loam, forming much of the lowlands. The highlands of the western half, known as "barrens," covered principally by a light gray siliceous soil, include spots, sometimes of considerable extent, of fine calcareous soils, always colored more or less red. These spots are found, either upon the highest points of the "barrens," or in their deepest basins; the soils in these two positions being derived from entirely different rocks. Those on the high points are from the disintegration of the St. Louis Limestone, whilst those in the basins are from the impure and crinoidal limestones of the middle and lowest beds of the Keokuk or Lower Siliceous formation. On some of the high points within the "barrens," are found cherty nodules, resting upon the light gray siliceous soil, relics of the now departed calcareous soil, and showing its last resting place. These "barren" soils have heretofore been looked upon as almost worthless, but, judging from the rapidity with which they are now being taken into cultivation, are fast coming into repute, and these lands may, at no distant day, be sought after, not only on account of their productiveness of certain crops, but also, with their pure water and air, and delightful climate, as quiet summer retreats from the dust and turmoil of the towns and cities. Doubtless, under kind treatment, these lands will be found good for most fruit crops, as they have already been shown, by the aid of a suitable compost, to be fine for cotton, tobacco and small grain. These soils can be made to yield, so it is said, one-half of a bale of cotton, or two hundred and fifty pounds of lint cotton to the acre, and the advantages claimed for them will more than compensate for the excess of fertilizers used. These advantages are: the lands are cheaper; they are more easily worked; they are never overflowed; the fruit ripens sooner; the staple samples better. The greatest objection to them seems to be that they do not hold fertilizers well, being able to retain not even the small amount of organic matter which annually falls upon them. In many places they look as if they had been leached, so completely have all traces of organic matter been washed away. They would therefore impose upon the farmer the additional labor and cost of more frequent applications of the manure or compost. The soil of the highlands or table-lands of the east (the gray sandy soil of the Coal Measures), is also, as a general thing, very poor, often nothing more than pure sand stained with a little oxide of iron. These table lands afford fine pastures, over which the cattle of the farmers of the adjacent valleys roam from early spring until late fall. Such lands when fresh, or when they have any strength at all, seem to be especially adapted to all root crops. They, like the "barrens," do not hold manures well, and hence require frequent applications. These highlands are, as yet, but thinly settled, but are beginning to attract considerable attention. Being from some twelve to fourteen hundred feet above the sea, their atmosphere is pure and invigorating, a perfect safeguard against the chills and fevers of the lowlands.

The soil of the lowlands, or the red lands derived from the disintegration of the St. Louis Limestone, varies from a deep red colored clay loam, to a nearly black, loose, calcareous soil. These soils are coextensive with the lowlands, occupying their whole area with the exception of a few isolated localities along the creeks and very low places, held by the soils of the underlying rocks. They form the farming lands of North Alabama and are always susceptible of the greatest improvement. Though now in many places much washed, and apparently worn out and lying out in old sedge fields, still, their original fertility could, in all cases, be gotten back, within a few years, by a little judicious handling. Containing within themselves all the ingredients necessary for plant food, they could, if properly cared for, be made to last forever without the addition of a single load of manure or pound of fertilizer of any kind from extraneous sources. Some of these soils have been abused for at least seventy-five years; that is, they have been worked upon the very exhaustive method of ever taking off and never putting back; they have been worked very shallow, they have been worked and trampled over during all seasons of the year and they have been cultivated year after year in the same crop, cotton, the only change being that of an occasional crop of corn, and still, though they have never been assisted in the least, are comparatively fertile wherever so situated as not to be easily washed away. Unlike the soils of the highlands, they are very retentive of all organic matter; taking well, manures and fertilizers of all kinds, and showing their effects for years after. Cotton and corn have ever been their staple commodities, though they are well suited to a great diversity of crops. The dark loamy lands of the South, lying along the river and creeks, made dark by the superabundance of organic matter, are especially suited to corn; they are the corn lands. The higher lands, the rolling lands in between the creeks and off from the river, the brown lands and the red lands, are the true cotton lands, of course, the brown and black tints of these lands are proportional to the amount of organic matter with which they are impregnated. The redder lands, the cotton lands, are also well adapted to the horticulturist. Though in effect very limited in its chief productions which are reduced almost to two, cotton and corn, there are few areas, of the same extent, which are capable of yielding a greater diversity of crops than Alabama, north of the Tennessee river.

Forests.—The forests of this region are chiefly confined to the highlands and to the inaccessible places of the lowlands. The highlands are still, in great part, covered with their native growth. Only a few small patches, immediately surrounding the cabins of the scattering settlers, and the fertile, though narrow, creek bottoms have, as yet, been cleared. The growth of the true highlands, or highlands of the west, consists principally of a dwarfed, hard, twisted grained post oak or blackjack, and the short leaf pine, though along the creek and ravines, especially near the heads of the ravines are found some noble trees of white oak, red oak, poplar, chestnut, etc. Saw mills, temporarily put up, are now often seen along these branches and creeks, and this fine timber will soon be a thing of the past. The growth of the highlands of the east is luxuriant, consisting, upon the level plateaus, or table lands, of oak, hickory, chestnut, pine and a few poplars, walnuts, etc. Along its sides, over the Mountain Limestone, are found, principally, cedar and pine, though some oaks, and occasionally a walnut and a poplar appear. The cedars cover the limestones of this formation, and the pines, the sandstones; their lines of separation are often very marked, and can be easily recognized from a distance, as the mountains are approached.

There is, comparatively speaking, but little left of the native growth of the lowlands. This little is confined, principally, to the creeks, very low places, and knolls, and consists, for the most part, of the different varieties of oak, hickory, and cottonwood. Occasionally one meets with a fine grove of oak and hickory, covering a high level area, but in most cases, such a grove will be surrounding or adjacent to some residence.

2. *Geology.*

Within this area, *erosion,* due to the action of running water, has laid bare many fine natural sections. It is thus made an interesting field to the Geologist.

An enumeration of the geological formations which are exhibited in these natural sections, or which occur within this area, together with their equivalents in other states, and their lithological characters, have already been given by the State Geologist in his report for the years 1877–78.

He also gives there a general section of the western part of this area, passing through Courtland and Moulton, which shows the relative positions of the different geological formations, their respective thicknesses and general dip. This information will be found in the above named Report, pages 11–18 inclusive.

In the section or cut referred to, it will be noticed that the two upper formations, viz., Mountain Limestone, and Coal Measures, are not shown north of the Tennessee River. This is for the reason that those two formations do not occur north of the Tennessee, except in Madison and Jackson counties, entirely east of the line of the section.

In the above named Report the general characters of the rocks making up the various formations in North Alabama, together with detailed descriptions of sections obtained in various localities, have been given.

In this Report, after an enumeration and a general sketch of the geological formations recognized in this region, I shall present additional details from parts of the country not covered by the previous Report referred to.

Beginning with the lowest, the geological formations to be described in the details below, together with their most characteristic strata, are as follows:

1. *Silurian.*—Of this age, the following rocks were believed to have been recognized:

(1) Gray, fossiliferous, granular dolomites and limestones and loose chert, belonging to the sub-group, Knox Dolomite, of the Quebec group of the Lower Silurian—appearing only in the anti-clinal valley of the eastern border.

(2) A dove-colored and highly fossiliferous limestone, believed to be of the Trenton group of the Lower Silurian. Found only in the same locality as the above.

(3) A highly fossiliferous, argillaceous limestone of the Nashville or upper group of the Lower Silurian rocks. Seen in the above anti-clinal valley and along the creeks of the western half of this district, as they flow into Alabama from Tennessee.

(4) Gray and variegated fossiliferous limestones, often shaly, a magnesian limestone, and also a dark gray sandstone—Rocks of the Niagara or Lowest group of Upper Silurian. They are next below the Black Shale. Seen along the creeks and ravines of the west, near the State line.

2. *Devonian.*—A black bituminous shale, alternating with thin seams of a fine grained sandstone seen along the anti-clinal valley of the east, and along the creeks and ravines near the State line, from Flint River westward. The most southern point at which these rocks were seen was near the Blair's Ferry road, in S. 34, T. 2, R. 6, W., in a ravine leading out from Elk River.

3. *Lower Sub-Carboniferous.*

(1) *Lower Siliceous or Keokuk or Burlington Beds.*—These rocks vary from an almost pure flint to nearly pure marble. They consist of flint or hornstone, shales, sandstones, and limestones, in all grades of purity. They are supposed to cover about one-half of this district, extending from east to west. Though highly developed in the western half, they are seldom seen or rarely come to the surface in the eastern half. They are cliff-making rocks, their upper or siliceous, or flinty portion, always forming the capping stone. They are regularly stratified, as shown along these cliffs, the under rocks, or limestones and sandstones of all grades of purity, seldom coming to light, except along these cliffs, and in a few basins where the siliceous crust has been cut through and removed. The rocks of the western half are, also, more characteristic than those of the eastern. These rocks have been fully described in the report already referred to. Thickness, some 150 feet.

(2) *Upper Siliceous or St. Louis Limestone.*—Impure or cherty limestones. These rocks are the surface rocks of the flat and rolling country bordering upon the Tennessee. They cover about one-third of the area under consideration, appearing in their greatest force near its central portion; here they extend from the river almost to the Tennessee line. They form the rich and fertile lands of this area, and it is doubtless mostly because of this fertility that all of the towns of this region are built upon its slight knolls. These rocks are not often seen in regular beds, but generally as scattered fragments, associated with sandy clay and cherty, fossilif-

erous nodules, the results of their disintegration. They, like the underlying, lower sub-carboniferous rocks, seem to thin out as we go eastward, in which direction the two formations appear to become consolidated into one, intermediate in properties between the two. Their greatest thickness is about 200 feet. They, too, have been fully described.

4. *Mountain Limestone, Chester Group.*—Limestones, sandstones, and shales. These rocks are confined to the eastern or mountainous half, their most western appearance being in Capshaw mountain, a few miles west of Huntsville.

They form generally the *sides* of the mountains, from just below the sandstone capping of the same, down nearly to the base in some cases, seldom themselves, however, extending out into the level or rolling plains below. The propriety of the name Mountain Limstone, is thus quite apparent. Near the western limits, the isolated peaks and spurs usually lack the capping of sandstone, being formed entirely of these calcareous rocks down to their sloping bases. The seam of sandstone often repeats itself, once or twice. These rocks vary very much in their respective thicknesses at different localities. They have a thickness ranging from 600 to 800 feet.

5. *Coal Measures.*—Sandstones, conglomerates, shales, and coal. These rocks as they lie upon those last mentioned, or as they form the tops of the principal mountains, are, of course, found only in the eastern half. They generally form the flat, or slightly basin-shaped area on top of the mountain, or the *table-lands;* and around the rims of these table mountains, the lower sandstones and conglomerates of this formation, usually form a line of cliffs, 30 to 50 feet in height, immediately above the Mountain Limestone. Near the foot of these cliffs are found the coal seams. There are sometimes as many as three of these, one above the other, separated by sandstones and shales. These seams vary in thickness from a few inches to several feet. Their coal also

varies much in quality, from a very pure to a very impure variety. Many of these seams have been worked in a small way by the neighboring blacksmiths, and a few on a larger scale, as the Elkmont coal and R. R. Co. seams, those on Monte Sano, near Huntsville, and the "Old Huntsville Mining and Manufacturing Co." seams. These seams, on account of their great height above the adjacent level country, can be worked on a large scale only by a great outlay of capital at first. Thickness of Coal Measures, from 150 to 400 feet.

6. *Stratified Drift or Orange Sand.*—Sand; rounded gravel or pebbles, iron conglomerates, formed of rounded pebbles held together by oxide of iron. These rocks are of no great superficial extent, occuring only in small spots covering a few high places.

II. COUNTY DETAILS.

LAUDERDALE COUNTY.

Area and Boundaries.—This county occupies the northwestern corner of Alabama, or the western portion of the section under consideration. It is bounded on the north by the State of Tennessee, on the south and west by the river Tennessee, and on the east by Limestone county and Elk River. It has an area of about 728 square miles or 465,920 acres.

It is very irregular in its shape, being from east to west some fifty-six miles long, whilst its average width from north to south, is not more than thirteen miles. Extending up to the vertex of the acute angle formed by the southern boundary of the State of Tennessee, and the Tennessee river, it projects beyond the extension of the Alabama and Mississippi line, south of the Tennessee, and thus takes in some thirty square miles, in this corner, which would have belonged to Mississippi, had the above line between Mississippi and Alabama been allowed to crop the Tennessee. Its eastern boundary is the line between Ranges six and seven, west from Huntsville, for some twelve miles, or until this line strikes Elk river, when this river forms the boundary down to the Tennessee. Its southern and western boundary is the river Tennessee, which, in the pursuance of a course about at right-angles to that for which nature seems to have intended it, is forced to twist and turn, thus making these lines anything but straight.

Drainage.—With a swift river sweeping more than one-half its boundary, and with many clear rapid streams passing through its whole width from north to south, this county has a complete system of drainage. Not a marsh or a pond of any size can be found within its limits, unless immediately upon the Tennessee. Every stream in the county flows within the county limits to the Tennessee, this river receiving *directly* the waters of every stream of any considerable size, with the exception of Anderson creek. The principal creeks are, commencing on the west, Second, Cypress, Shoal, Blue Water and Clear, not counting Elk river, which, like the Tennessee, does not flow through it, but merely forms a portion of its boundary. Of these, the three principal are, Cypress, Shoal, and Blue Water, draining all the central portion of the county from north to south, partly rising within the state of Tennessee. They alone of the streams of the county have tributaries of any size, though the smaller streams of the eastern and western portions of the county cannot, by any means, be looked upon as insignificant, especially during freshets or high waters. Of these smaller streams, Anderson, First, Six-mile, Bluff, and Four-mile, are the most important. The three larger creeks, together with Anderson, all rise near the State line, either just north or south of it, in the great highlands of Tennessee or their extensions. All, flowing south, empty their waters directly into the Tennessee with the exception of Anderson creek, which flows into Elk river, about six-miles from its mouth, or one mile below the point where it first touches the county. The smaller streams all rise near the central portion of the county, north and south, and flowing south, empty their waters into the Tennessee. They thus help to drain the southern half of the county. These streams being all fed by pure, bold, everlasting free-stone springs, never go dry, and hence, man nor beast in Lauderdale county need ever grow thirsty for want of pure water. The surface of this county having a natural inclination towards the south, and being greatly wasted away on the south by the erosive action of water, these streams all have a great fall, and hence rapid currents. Cascades are numerous along them, and the amount of water power thus allowed to run to waste is too great to be estimated. These streams being confined to narrow limits, and their fall being so great, all, even the smallest, are dangerous during high waters.

General Configuration.—In general, this county presents an extremely broken surface. bordered on the south by a large, crooked stream, with a narrow basin. More specifically: in the north, it consists of a high plain-like area, cut up by deep, long, narrow ravines, extending north and south, from which ramify other smaller ravines in all directions; in the central portion, of ridges and ravines, hills and hollows; and in the south, of a greatly inclined basin of very unequal width, filling up all the southern bends in the river, and interspersed here and there with small knolls. Nearly all of this diversity of scenery, etc., is due to the action of running water; for, originally the whole area occupied by this county had not a single ridge or hill, ravine or hollow, but was a plain, gently sloping from the north to the south, and with entirely different rocks, soil, and forests in the northern and southern parts. This northern portion (about five-sevenths) constitutes the "barrens," or the highlands; the southern portion (two-sevenths) forms the lowlands. The highlands, recognized by its poor, white, siliceous soil, and its growth, principally, of seemingly stunted trees; and the lowlands, by its rich black and red soils, and its growth of oak and hickory. These differences would strike the casual observer, and to make sure one would have only to examine the rocks. The dividing line between the highlands and lowlands, is very crooked, especially in the western and eastern parts of this county where most broken.

This county may perhaps best be described by dividing it into three divisions, extending clear through from north to south. The first or western third extending eastward a few miles beyond (east of) Bluff Creek; the central portion thence eastward to Shoal Creek, and the eastern or third portion, from Shoal Creek to the eastern boundary of the county.

The First or Western Division.—This portion of the county is very broken indeed, so much so as to make it impossible to have a road across it from east to west, except along the river basin. It consists, it may be said, entirely of the highlands, cut into ridges by deep narrow ravines. These ridges extend down to within a mile of the river, or less, where they end more or less abruptly. These sharp terminal points of the ridges are all rounded on top, and covered with loose cherty rock, but as they recede towards the highlands, they generally widen out, becoming flat on top, their sides steeper, covered with fewer loose rocks and more bedded ones. The ravines between the ridges, narrowing as they go back from the river, keep their depths for long distances, but finally gradually emerge into the highlands above. The flattening of the pointed ridges on top as they go back, occurs whenever the streams or ravines on each side of them are so far apart as to leave a portion of the original uneroded land surface between. Being parts of the same level highlands on the north, these ridges all have a uniform height, or very nearly so, corresponding to these highlands. These ridges have their bedded rocks almost level, dipping a little, perhaps, towards the south or southwest, hence they have been cut out, and were not cast or thrown up after the manner of all true ridges. They are now ridges merely because the parts between them have been washed away whilst they have been left. The ravines, as would be inferred from what has been said, are widest at their mouths, where their slopes are most gentle, narrowing as they go back with their sides becoming steeper. In many of these ravines there is at present no running water at all, and in many others the streams are very insignificant indeed, merely small spring branches.

The Second or Central Division.—This division is drained by Cypress Creek and its tributaries, and by the western tributaries of Shoal Creek; this portion of the county is not nearly so much broken as that just described, being, except near the water courses, a comparatively level tract, especially in its central and western part. The highlands constituting about two-thirds of the whole are more even and uniform, not so much cut up by ravines and more gently and gradually passing into the lowlands below. Not having many cliffs along its river border, it has some first bottom land. The lowlands are traversed by Cypress Creek flowing in many places through a deep narrow channel, which, near the northern limits of the lowlands, is bounded by steep hills and ridges deeply furrowed by enormous gullies. The eastern portion of this division, or that part bordering upon Shoal Creek, is more or less broken, clear through to the river on the south: this third contains four times as much lowlands, or fine, rich lands, as all of the rest of the county. It contains all the rich, fertile land in the great southern bend of the river southwest of Florence. These lands constitute for the most part a gently undulating plain, second bottom lands, and much of them have been in cultivation in cotton and corn, cotton principally, for the last seventy-five years, and though no fertilizers of any kind have ever been added to them, they are still comparatively fertile and could easily be gotton back to their primitive value by a little judicious handling.

The Third or Eastern Division.—This division presents a great diversity of scenery, being more broken than the central division, though not so much so as the western. It is drained by Six Mile, Blue Water, Clear, First and Anderson Creeks, and the eastern tributaries of Shoal Creek. These streams all flowing southerly are, of course, more or less parallel, and are not more than three or four miles apart. They all flow through deep narrow ravines, the margins of which along the largest of these streams are deeply indented by the larger tributaries, forming what might be termed creek-hills and ridges. These ridges and hills extend along through to the Tennessee, and are themselves cut up by deep narrow ravines, down which the smaller tributaries flow. The smaller streams have also these side ravines but not hills and ridges. These side ravines have wide mouths, soon narrowing up, and they are as a general rule short, the streams running down them having a great fall and often several falls.

The country in between these creeks and their tributaries, in the highlands, is level, whilst in the lowlands it is rolling, especially so near their northern boundary. This division has its river course bordered by bluffs of the highland rocks, and hence it has no first bottoms, except along the mouths of the creeks, and here but little, since these are narrow. Its second river bottoms, or its lowlands or red lands, have an average width of not more than three miles, and are by no means level, but rolling, and much washed and spotted over with old worn out fields, cut up by cross branches, etc. There are also scattered over it, in the lowest places, many barren spots in which the characteristics of the highlands show themselves. Many of these creek and river hills and ridges are still covered with their native forests, it being almost impossible to get the wood off of them.

Soils.—The soils of this county belong to the two characteristic varieties, the white siliceous soil of the highlands, and the red loamy soil of the lowlands. These soils have already been fully described. The soil covering the river and creek hills, within the highlands, derived from the disintegration of the impure limestones of these rocks, is more or less red and quite productive. On account of the steepness of these hills, it has to be cultivated to a very shallow depth, and hence the soil is liable to be washed away by every freshet or hard shower. This county is so well drained that there are few places lying uncultivated because too wet, and these few are found next to the river, in its first bottom. These first bottom lands, when so lying as to be overflowed, but not subjected to currents, make the finest corn lands, not suitable, however, to cotton, which goes too much to stalk.

Springs.—Springs are found in this county in all places where the country is the least broken. They are seen gushing out from all along the creeks and ravines, and cliffs and hill-sides, and often, boiling up from the low-flat places. Many of them are of good size, and most of them of pure free-stone water. Chalybeate springs are common, and, in the upper portion of the county, springs of other medicinal properties occur. They seem to be most numerous near the southern edge of the highlands, the country here being most broken; and more numerous within the highlands than the lowlands, though, as a general thing, not so large. The road leading from Gravelly Springs to Waterloo, running along the foot of the highland ridges, has along it more springs than any road of same length known. As an average sample of the large springs of the lowlands, Cave spring might be mentioned. This spring is found within the Colbert Reservation. It flows from out of a cave, and runs off, swiftly, in a stream some fifteen feet wide, and an average depth of at least six inches.

The most noted springs in the county, or rather in North Alabama, are the Bailey Springs, nine miles northeast of the city of Florence. They are several in number, namely: "Rock Spring," "Brick Spring," and Soda and Alum Springs. The first two are so called because they are walled up with those materials. "Rock Spring" is the original Bailey Spring; its waters were roughly analyzed by Prof. Tuomy, and its principal ingredients found to be Carbonic Acid, Iron and Soda. The waters of "Brick Spring" are said to contain more iron than those of "Rock Spring;" they are both believed to hold arsenic, in solution. The Soda and Alum Springs are said to be strongly impregnated with the Carbonates of Soda and Potash. Their waters appear to be something cooler than those of Rock and Brick Springs. They are all tasteless. As to the curative properties of these waters, references and certificates are innumerable. They are said to be especially good for Dropsy, Dyspepsia and Scrofula, and all skin and liver diseases. These springs are located at the head of a little ravine, which extends down to Shoal creek, one-half mile distant. They flow from under a cherty ridge, formed of the Lower Siliceous rocks, on the top of which is situated the commodious hotel, and between the spring and hotel, along side of the hill, are the beautiful grounds, with their tastefully laid out walks, etc.

Forests.—The forests, or wooded lands of this county, might be said to be coextensive with the "barren" rocks, for wherever these rocks form the surface, there too, as a general thing, will be found the native growth still standing. The exceptions to this general statement are few. It is true that most of the long, narrow bottoms along the creeks within the "barrens" are cleared up, but the surface rocks of these tracts, are generally, whilst belonging to the same formation, entirely different from those constituting the barrens. The latter are a flinty or coarse cherty rocks, the other varies from an impure to a very pure limestone. Much of the timber found within the lowlands is over these cherty rocks, along the creeks and covering the very low places. Occasionally a grove or narrow strip of timber may be found on the true "red lands," but they are few and far between. The principal growth of these "highlands" is a hard, scrubby, twisted grained oak and the short leaf pine. The latter occurs in patches. Along the creeks and ravines of the highlands and sometimes upon the highlands themselves, but especially near the heads of the ravines, there are found some fine trees of white oak, chestnut, poplar, maple, etc. These large trees are fast being cut down. The timber covering the small spots within the lowlands consists principally of the different varieties of oak, hickory, and cotton-wood.

GEOLOGICAL FORMATIONS.

1. *General Description.*

The surface area of this county is made of the following geological formations:

- (4) Superficial Drift Deposits.
- (3) Lower Sub-carboniferus.
  - (1) Upper Siliceous or St. Louis Limestone.
  - (2) Lower Siliceous or Keokuk.
- (2) Devonian or Black Shale.
- (1) Silurian.

KINDS OF ROCKS.

Silurian.—Variegated, argillaceous, and shaly limestone—some of the argillaceous looking limestones, magnesian limestones. They belong generally to the Niagara group, of the Upper Silurian formation, and to Safford's Nashville group of the Lower Silurian. They cover a very small extent of surface, being found only near the State line, along the creeks and ravines of the central and eastern portion of county.

Devonian.—Black bituminous shale, and a fine grained, thin sandstone. The shale, the principal rock, occurs in several seams, divided by this thin sandstone. Sandstone, generally, dark gray in color. These rocks, being just above the last named, are of about the same superficial extent. They are about eight feet in thickness.

Lower Siliceous or Keokuk.—Bedded chert, siliceous gray and blue limestone, shaly limestones, blue and gray limestone, and white crinoidal limestone. The ecrinital or crinoidal limestone varies in color from dark gray or blue to perfectly white. The lighter variety generally contains the greater number of fossils. This limestone also varies much in composition, sometimes being very siliceous, at other times an almost pure limestone with few fossils, and still again it is a mere mass of crinoidal stems. These rocks are regularly stratified; the upper strata consisting of chert, often flint, and the middle and lower strata, of impure, pure, and shaly limestones. Some of these lower rocks, ecrinital limestones, are in places a very good marble, and could be quarried with ease, since they have regular planes of division. The rocks of this Lower Siliceons group form about five-sevenths of the county, almost the entire eastern and western thirds, especially in the western third, extending clear through to the river. Through the central portion, however, on account of a great southern bend in the river, the county widens out, and a considerable area underlaid with rocks of the Upper Siliceous group, comes in south of the highlands.

In general the country covered by these rocks, the "barrens" namely, as above explained, is a gently inclined plain, except near the water courses, (and especially when these are numerous), where the country becomes a mere succession of ridges and isolated hills.

Upper Siliceous or St. Louis Limestone.—Cherty, fossiliferous limestones. These rocks are pre-eminently the rocks of the lowlands, and occur in but a few small patches outside of them, on some of the higher points of the highlands. Being easily disintegrated, they are seldom seen in beds. The cherty portions, generally a few inches in diameter, are often met with, especially on the hills and knolls of the lowlands. They do not occur in this county in any very great thickness, since the Lower Siliceous rocks make their appearance in the beds of the streams which cut through them, and along the banks of the Tennessee. They cover about 200 square miles, principally southwest of Florence, filling up the great southern bend above spoken of and making the very fertile area elsewhere described. All of these lowlands were once fine, but now, where the country is most broken, especially near their northern boundary, there can be seen many old fields lying out and grown up in sedge, bushes, briars, etc. Florence and Rodgersville are both located near the northern boundary of the lowlands.

Superficial Drift Deposits.—Beds of gravel; gravel and sand; and iron conglomerate, rounded pebbles held together by oxide of iron. The extent of these rocks is very limited, indeed, when compared with the underlying Sub-carboniferous rocks. They are found only in a few small spots covering some of the higher points of the highlands.

2. *Details and Sections.*

Silurian and Devonian.—These rocks were seen on Blue Water, and according to Professors Tuomey and Safford, and others, appear on the other large streams, from Shoal Creek eastward, as they enter the State from Tennessee. The lowest, or most southern point at which they were seen, was in the southern portion of S. 25, T. 1, R. 9, W., in the bed of a dry branch, along which Blue Water partly flows during very high waters, and just south of the mouths of the sinks to be hereafter described. Along this branch, within a distance of seventy-five yards, Black Shale, separated by a thin seam of dark fine grained sandstone, appeared in outcrops some eight times. The dip was very slight and both north and south, thus showing undulations. These rocks (Silurian etc.,) were next seen at Allen's Ford, some two and a half miles above the last named locality. At this place they occur in the bluff forming the eastern boundary of the valley. The foot of this bluff was at least fifteen feet above the creek. The rocks were regularly stratified and had a decided dip southward. The section is as follows:

Section at Allen's Ford, on Blue Water Creek.

Lower Siliceous.	(12) Earth	15 ft.
	(11) Light grayish blue limestone	8 in.
	(10) Dark shaly limestone	4 in.
Devonian..	(9) Black shale	6 in.
	(8) Dark, shaly, reddish yellow sandstone	6 in.
	(7) Black shale, with divisions of a dark sandstone	4 ft.
	(6) Dark sandstone	8 in.
	(5) Black shale	1 ft.
	(4) Dark shaly sandstone	1 ft.
	(3) Black shale	3 ft.
Silurian...	(2) Light colored limestone, shaly towards top	4 ft.
	(1) A variegated, hard, compact limestone	2 ft.

Loose slabs, some two and three feet in diameter, of this Black Shale, were also seen in the bed of the creek at the State line.

Sub-Carboniferous.

(1) *Lower Siliceous or Keokuk.*—Just south of the road at Binford's or Smith's Ford on Elk River some fifteen feet of a shaly siliceous limestone were seen, changing to beds of regular chert below. The Elk river hills occurring along this road are more or less red, formed, principally, from the impure limestones of this formation. Just before reaching Rodgersville, the road crosses several narrow strips of "barren" land. These "barren" rocks extend down about to Rodgersville from the north, though there is considerable "red land," in spots, north of this town. Along the road from Rodgersville to Florence, the same rocks are seen at all the creeks and branches, and in all the very low places and gullies. From Rodgersville to Blue Water, this road is just within the "red lands," or near the line separating the red lands from the barrens. At the crossing of First Creek, the following rocks were seen in the creek and along the road as it rose the hill on the west:

Section on First Creek.

(10)	Loose nodules of fossiliferous chert mixed with red clay, forming surface.	
(9)	Shaly cherty limestone	5 ft.
(8)	White siliceous clay, disintegrated chert	2 "
(7)	Shaly and yellowish cherty limestone	18 "
(6)	Shaly limestone, argillaceous below	4 "
(5)	White plastic siliceous clay, containing cherty fragments	2 "
(4)	Soft, yellowish white plastic mass or clay	15 "
(3)	Cherty argillaceous limestone, yellowish when weathered	2 "
(2)	Shaly limestone, becoming cherty below	3 "
(1)	Hard, bluish gray limestone, making small step-like irregularities in the creek.	

Beds numbers 4, 5 and 8, exhibit well the results of the weathering of the flinty "barren" rock, of which Prof. Tuomey speaks.

The hills and bottom lands of this creek, together, are not more than a quarter of a mile wide.

At the road crossing, we have the following

Section on Clear Creek:

(2)	Shaly limestone, with chert	10 ft.
(1)	Dark gray shaly limestone	2 "

The bottom and creek hills of Clear Creek are no wider than those of First Creek above.

As the iron bridge across Blue Water was approached, the following rocks were seen, beginning at the top:

Section on Blue Water Creek.

(8)	Bedded chert	4 ft.
(7)	White siliceous clay, with nodules of chert	3 "
(6)	Bedded chert	10 "
(5)	Shaly limestone	3 "
(4)	Bedded chert	30 "
(3)	Shaly limestone	6 "
(2)	Cherty limestone	8 "
(1)	Beautiful white crinoidal limestone—a very good marble—extended down to the water edge	4 "

No. 1 is the rock from which the locks at Muscle Shoals are made; and No. 7, affords another example of the results of the weathering of the hard cherty rocks.

These rocks are nowhere better exhibited than along Muscle Shoals, which have been so well described by Prof. Tuomey. They can be seen both in the river forming the Shoals, and in the perpendicular sections made by the cutting of the present canal. The rock which forms the Shoals in the river at the mouth of the Blue Water, is a dark grayish blue, very hard, fossiliferous cherty limestone. The upper beds of this rock have been weathered into a porous mass, the cherty portions remaining prominent. The canal being cut along the northern bank of the river, is, of course, between the river and the cliffs which line its northern bank. These bluffs are not continuous, but are separated by gaps, down which flow the streams and branches. The smaller branches, in reaching the river from the adjacent high level lands, often have considerable falls.

In a bluff just below the mouth of Blue Water, the following rocks were exposed:

Section om Tennessee River, below Blue Water Creek.

(10)	Chert, with reddish clay partings to top of bluff	15 ft.	0 in.
(9)	Friable, rotten shale with alternating thin seams of chert above	3 “	0 “
(8)	Shaly limestone	0 “	10 “
(7)	Shale with cherty concretons	3 “	0 “
(6)	Shaly limestone	0 “	6 “
(5)	Alternations of light fossiliferous limestone and shaly limestone	8 “	0 “
(4)	Shaly limestone, slightly siliceous, and with few fossils	3 “	0 “
(3)	Alternating thin beds of fossiliferous cherty limestone and shaly limestone	12 “	6 “
(2)	Light fossiliferous limestone, with thin seams of chert	5 “	0 “
(1)	Rocks covered with debris from above, forming sloping sides of the canal, about	15 “	0 “
	Thence to river level	10 “	0 “

Another section about three quarters of a mile above that just described, is as follows:

(6)	Fragments of chert, imbedded in red clay, forming surface	20 ft.	0 in.
(5)	Bedded chert	10 “	0 “

(4) Hard, siliceous crinoidal limestone, in four regular beds, each about four feet thick, separated by thin strata (1 inch) of shaly limestone.:	16 ft.	0 in.
(3) Siliceous shaly limestone, lower part merely bedded chert	5 "	6 "
(2) Hard, light gray, tolerably pure limestone.	6 "	0 "
(1) White fossiliferous limestone to bottom of section	15 "	0 "

Though these two sections are so close together, they show a great variation both in the composition and relative thicknesses of the different strata. In some places, the river cliffs seem to be made up almost entirely of thin beds, six inches in thickness, of fossiliferous cherty limestone.

The material of which the locks of the canal have been constructed, is a beautiful white crinoidal limestone, which, judging by the appearance of the locks, is most admirably adapted to architectural purposes.

According to Prof. Tuomey's observations the rocks of the Lower Siliceous Group, in the vicinity of the Muscle Shoals, are about one hundred feet in thickness. They are exposed along Blue Water Creek, up to the State Line.

One mile above the iron bridge over the creek, a very good example may be seen of effects of the weathering of these hard, siliceous, crinoidal limestones.

The rock in question was originally the same as stratum No. 4 of section last given above, but has been changed into a reddish yellow clayey substance, very porous and friable; in which are embedded the almost unchanged crinoidal stems. The whole stratum is now so soft that large masses of it can easily be broken off and crumbled to pieces with the hands, the crinoidal stems falling out like grains of wheat from so much chaff.

At Phillip's Mill, the rocks of this formation were finely exposed, both in the creek and in a bluff above it, some seventy-five feet high. The rocks of the creek were the same hard, grayish blue, cherty limestones as those seen in the Tennessee.

About one mile above this mill, on Mill Creek, a tributary of Blue Water occur very large slabs of cherty limestone. These hard, cherty slabs are underlaid by soft, shaly limestone; and the weathering out of the softer, lower rock leaves the other prominent and projecting, thus forming numerous little step-like offsets, which make beautiful cascades. Still higher up, about five miles from the State line, this creek entirely disappears through the shaly limestone of this formation, and after having run underground some two hundred yards or more, reappears, principally in the same rock. This locality is known, throughout this section of the country, as "the sinks." Before reaching this point, the creek runs between two ridges, or rather along a deep narrow valley, bounded by steep acclivities, on top of which the country is level. The sides of this valley gradually converge, but just before they come together, or just after passing the mouths of the sinks, the valley makes a sharp turn from south to west and instead of flowing around this sharp curve, the creek has cut its way under a point of land to the channel on the other side. The openings by which the creek disappears are one-fourth of a mile above the sharp curve, and of course, in the cliff forming the western boundary of the valley. They occur along the cliff for a distance of seventy-five or one hundred yards, separated by partitions, and are at their outer edge some eight feet high, dwindling down to two or three within twenty feet. The mouths of these openings are, as we have said above, mainly in the shaly limestone, though their roofs are formed of the harder and more siliceous rocks. These openings were partly filled up with old logs, rails, etc. The water at the time of my visit being very low, was flowing only through the upper or most northern, and smallest opening, but during high waters the greater portion goes through the other, larger openings, and when they all combined, are not sufficient, the surplus flows around the sharp curve, or keeps the valley along two channels, which are at other times dry. The largest of these openings, the most southern one, it is said, has been traversed its whole length, but this is extremely doubtful. In the field covering the point under which this stream passes, the earth has fallen in, in several places, showing the subterranean channel to be about fifteen feet beneath the surface.

This field is considerably lower than the surrounding country, outside of the valley. The visible outlets, two in number, are very small in comparison with the inlets, and it seems impossible that they could permit of the passage of all the water that flows off below them. The stream not only starts off boldly, but even has some back water, hence it is believed that there are other outlets, "sub-aqua." There seems to be little regularity in the dip of these rocks, near the mouths; in places, they look as if they had been broken apart and then squeezed up together. The principal outlet is in one of these cracks or joints. With the exception of a few beds of loose pebbles, there appeared to be no obstruction along the open channel of the creek.

About one-fourth of a mile above the sinks, two bold springs break out about half way up the cliff. They flow from the shaly limestone, just above the cherty rocks forming the roof to the opening. About three and one-half miles above the sinks, near the mouth of Hurricane creek, occurs a bluff some seventy-five or eighty feet high, of the beautiful white crinoidal limestone, which makes so prominent a feature of this formation. It was regularly stratified, occuring in beds of three feet thickness, separated by thinner shaly strata. This rock had been quarried to some extent, and, on account of its being disposed in regular beds of such a convenient thickness, it might be gotten out cheaply. The creek, too, runs along the base of the cliff, furnishing a channel for transportation during high water. The cliff was covered at its base, with about twenty feet of debris. At Wilcox and Smith's mill, the shaly and cherty rocks of this formation are seen in beds of about fifty feet thickness. In this section of country, there is much fine timber of oak and poplar, even outside of the bottoms. Along the little short ravines, leading down to the creek a mile or so from State line, are several small rock houses, as they are called, formed by the wasting away of the soft shaly limestone from beneath a capping of hard, cherty rocks. These rocks seem to have a slight dip to the north, which, taken in connection with the fact that the same rocks have a slight southward dip near the sinks, goes to prove that they are undulating. At the State line, forming the western boundary of the valley, was a cliff some hundred feet high of the ecrinital limestone, more or less cherty and shaly. Just within the State line, in the field between the above named cliff and the creek, there are some four or five sinks, some of them bottomless, i. e., with a rail as measurer. In some water is standing, and during freshets, the water boils up out of all of them. They are doubtless connected with the creek, for in the creek bank, just opposite a large piece, as it were, is taken out, and just here there used to be, in the bed of the creek, a hole which swallowed up all of its water. The nearest of these sinks is some hundred yards from the creek.

Much of the country northwest of Lexington is broken, the creeks and small branches, trbutaries to Blue Water, being numerous. In all of these branches, occur shaly and cherty limestone, and chert of this formation. The country is tolerably thickly settled along water courses, the soil along the steep hill sides, formed from these impure limestones, being quite productive. Lexington is situated on a little red cherty hill, surrounded by "barrens." At the bridge across Shoal Creek, on the Florence and Athens road, the chert and cherty limestones are exposed in a section of fifty or sixty feet in height. In the creek they form shoals.

These rocks are seen up this creek at least as high as the crossing of Military road. This road approaches the creek from the east, by a deep narrow ravine, along which are seen many beautiful ferns. Bailey Springs, some two miles down the creek from this ford, flow from the chert of this formation at the head of a little ravine, about one-half of a mile long, extending down to Shoal Creek, along which ravine the following rocks were observed:

Section near Bailey Springs.

(11)	Bedded chert, seen only up to level of the Spring	3 ft.
(10)	Dark grey cherty limestone	1 "
(9)	Bedded chert	20 "
(8)	Alternations of siliceous and shaly limestone with chert	15 "
(7)	Crinoidal limestone, highly fossiliferous	20 "
(6)	Dark grey cherty or siliceous limestone	2 "
(5)	Crinoidal limestone	25 "
(4)	Dark grey limestone	3 "
(3)	Crinoidal limestone	15 "
(2)	Dark grey limestone, few fossils	1 "
(1)	Crinoidal limestone to water's edge	3 "

The beds from 1 to 7 constitute the crinoidal or encrinital limestone, and from the section it will be seen that the layers vary greatly in their fossil contents. The color also varies from dark gray or bluish, to nearly white. The lighter colored varieties contain most fossils, some parts being almost entirely made up of these crinoidal stems.

The country north of Florence for four or five miles, between Shoal and Cypress Creeks, is quite broken, and consists of a mixture of barrens and red lands.

The town of Florence though resting immediately upon St. Louis Limestone, has the underlying Lower Siliceous rocks not very far below the surface, as is shown by their outcropping on all sides near the bottom of the first hills.

In some places these rocks show well the effects of weathering, where by the removal of all calcareous matter a porous mass of chert is left.

These bedded cherty rocks are seen all the way along the road from Florence to the bridge across Cypress. Cypress, for four or five miles above the bridge, and for about one below it, is very crooked. Winding along a deep, narrow gorge, with steep, precipitous gaps along its sides, it presents, in many places, picturesque sights. There is very little bottom land on Cypress or its branches.

The road, from within a mile or so of Cypress Creek, to within about three of Bluff Creek, runs along near the irregular southern edge of this Lower Siliceous formation, crossing narrow strips of barren lands alternating with the red lands of the Upper Siliceous Group. Oakland is situated near the dividing line, the country north of it being principally barrens, though containing many red hills, lying out in old sedge fields; south of it, are mostly red lands, though, for a mile or so, many barren spots occur in the low places, covered with their native growth. The road, within about three miles of Gravelly Springs, strikes the ridges, and runs along the base of these until it ascends the high ridge bordering on Bluff Creek. This road and little valleys between these ridges, are covered with a white siliceous powder or dust, from the disintegration of the rotten, porous cherty nodules which completely cover the hill sides. As the high ridge bordering on Bluff Creek is ascended, beds of chert and a yellowish white clay, resulting from their disintegration, may be seen.

These ridges trend in a direction a little west of south, and they extend down to within one-half of a mile of the river. From these ridges westward, the country might be said to be composed entirely of the rocks of this Lower Siliceous formation. One or two miles up the river, from the most easterly of these ridges, commences a cliff, which extends along the river some two miles. This cliff is about one-half of a mile from the river, and is the dividing line between the first and second bottoms. From out of this cliff, at Chandler's ferry, flows the Cave Spring, already mentioned. The entrance and room of this cave, as far as could be seen, was about six feet high. There were two principal openings of fifteen and twenty-five feet respectively, separated by a pillar. The roof of the cave is supported by many natural pillars. During the summer months there is a constant stream of very cool air from within outward. This stream of cool air, on a hot day, can be felt ten feet from the mouth of the cave.

It is said that the cave has been explored to a distance of two miles from the entrance, and that it contains many beautiful stalactites and stalagmites.

The rocks exposed in the bluff are as follows, beginning above:

Section at Cave Springs.

(6) Loose cherty fragments forming surface............	15 ft.
(5) Cherty limestone, only partly exposed...............	4 "
(4) Ecrinital limestone: a light colored, highly fossiliferous limestone, disposed in beds of varying thickness, separated by thinner beds of shaly, siliceous, and dark gray non-fossiliferous limestones..	70 "
(3) Chert and cherty limestone, both shaly.............	4 "
(2) Light gray fossiliferous limestone....................	2 "
(1) Shaly limestone also fossiliferous, water's edge.....	4 "

The cave is excavated from the rocks Nos. 1 and 2, which form also the pillars alluded to above. The roof of the cave is formed of No. 3.

The valley of Bluff Creek is very narrow, with its high borders gapped by many deep ravines. Its direction is north and south until it reaches Gravelly Springs P. O., when it is changed to the west. Near where the course of the creek is changed, a cliff is exposed, with the following rocks:

Section near Gravelly Springs P. O.

(4) Loose fossiliferous chert imbedded in soil—surface	30 ft.
(3) Crinoidal limestone, light gray and blue above, white below	45 "
(2) Bedded chert	3 "
(1) Dark gray limestone, changing above to light gray	40 "

The spring flows from just under No. (1). About midway of this bluff is a cave, the mouth of which has been sealed up, and it is now used as a cool house, for fresh meats, etc. Springs are very numerous all along the course of Bluff Creek. From Gravelly Springs, the road to Waterloo passes over ridges and through small coves for about four miles, when it strikes the second bottom of the river, continuing in this second bottom until within two or three miles of Waterloo, when it strikes the ridges again and keeps along the foot of these on to Waterloo. These coves were once fine lands, but are now much worn by constant cultivation in cotton. The basin of the Tennessee on the north, in this vicinity, including both first and second bottoms, varies in width from one-fourth to three-fourths of a mile. The ridges on this side of the river slope off gradually, but, on opposite side, they end with bluffs overlooking the stream. At the foot of the hill below the town of Waterloo, some eight or ten feet are exposed of a hard, cherty, dark blue limestone regularly stratified, the same rock as that at Muscle Shoals. The valley of the Tennessee at Waterloo is about one-half a mile wide, and this average width is maintained up to the Tennessee line. The county, west from Second Creek is very much broken, indeed, so much so as to render roads impossible across it. The valley of Second Creek is very narrow and very much eroded, covered in many places with heaps of pebbles. It has a very rapid current, and during high water it is considered very dangerous to cross it. The road runs along the eastern edge of the valley and is covered with chert and iron conglomerate from the ridge above. Between two and three miles from the State line, along the bed and banks of the creek, a stratum of dark grayish blue shaly and cherty limestone was seen.

At the mouth of "Luster Hollow" the valley of Second Creek is not more than three hundred yards wide.

In this Hollow, about a mile from its mouth, there is a cliff some seventy-five feet high, made up of highly fossiliferous chert so deeply stained and impregnated with iron oxide, as to form in some places a poor iron ore. This cliff resembles, in many respects, exposures of St. Louis Limestone. Near the head of this Hollow some fine timber is still standing.

(2). *Upper Siliceous, or St. Louis Limestone.*—No *bedded* rocks of this formation were seen in this county, the only traces of it being found in occasional pieces of impure limestone and cherty nodules. These pieces of limestone occur intermixed with the red clay resulting from their disintegration; and the fossiliferous chert, often porous and spongy, is principally seen covering the knolls and ridges. What we have said, in a general way, of these rocks and the country formed by them, will answer in all particular cases for this county.

Stratified Drift or Orange Sand.—On top of the high ridge bordering upon Bluff creek on the east, there was seen a thick bed of gravel, underlaid by a stratum of red clay. All along the road running along the eastern edge of the valley of Second creek, and along the northern edge of "Luster Hollow," there were seen fragments of Iron conglomerate, consisting of rounded pebbles held together by Iron oxide, fallen from the ridges above. These pieces were sometimes several feet in diameter. On the high level country, between the head waters of Bluff creek and those of Luster Hollow, there occur scattered beds of gravel and sand of this geological age.

LIMESTONE COUNTY.

Boundaries and Area.—This county lies between the State of Tennessee on the north and the river Tennessee on the south, and the county of Madison on the east and that of Lauderdale on the west. It contains an area of about 600 square miles or 38,400 acres.

Drainage.—The Tennessee River, forming its southern boundary, receives either directly or indirectly every drop of water that falls within its limits. In conformity with geological structure, the surface inclination is towards the south, and in this direction the streams, consequently, all flow. There are few counties in the State that have a better system of drainage; almost every square mile of its territory has a creek, and every township two or more of its larger streams, thus affording, in all quarters, an abundant supply of water. The eastern portion of the county is drained by Limestone and Piney creeks, and their tributaries. Both of these creeks rise just within the State of Tennessee, in the great east and west divide, for this portion of the State, between the Tennessee and Elk Rivers, composed of the highlands of Tennessee. These two creeks near the State line are nothing more than little rivulets, of perfectly clear water, flowing rapidly over gravelly bottoms. After becoming large streams, they both flow southerly and nearly parallel, about four miles apart, through more than half the length of the county, before they commence to converge, finally coming together in about two miles of their common mouth. Limestone being the larger, Piney might be termed a tributary of it. Limestone is also the more easterly of the two.

The central portion of the county is drained by Swan

Creek and its tributaries. This creek is smaller than either of those just mentioned. It rises in the northern portion of the county, rather south of the great divide above spoken of, and flowing southerly to within a few miles of its mouth, is deflected to the southwest, emptying into the Tennessee. The great water course for the western portion of the county is Elk River. This river rises within the State of Tennessee, entering Alabama near the middle of the northern boundary of this county, by a deep, narrow valley, cut down through the "barren" rocks, forming the divide above spoken of. Flowing in a general southwest direction, along a tortuous path through the county, it strikes the western boundary about seven miles from its mouth, below this point, forming the boundary itself. Near its central portion, it receives its greatest tributary in this county, Sugar Creek. This creek may be said to drain all that portion of this county west of Elk River. Rising in Tennessee, it enters Alabama near the northwest corner of the county, and flowing thence southeast until it empties into Elk River, it divides that portion of the county west of Elk River into two nearly equal parts. The eastern tributaries of Elk River within this county are many and small. Besides those already mentioned, there are other minor streams which help to drain the southwest portion of the county, between Elk River and Swan Creek. They flow nearly south, and empty immediately into the Tennessee.

General Configuration.—Much of the variety in the surface features of this county, as well as of all North Alabama, is due to the great denuding power of running water. But for this agency, as in Lauderdale county, so here, there would not have been a single ridge or valley, hill or hollow, within its confines. As it is, there is not a single mountain in Limestone county, and off from the creeks, very few hills and ridges. With the great highlands of Tennessee on the north, and the great water courses of North Alabama on the south, and with entirely different geological formations in its northern and southern parts, that on the north being but little affected by the agencies which would waste away the other, and with a slight dip of the rocks to the south, it is but natural that the surface of this county should slope towards the south. This northern portion is the *true highlands*, the highlands of Tennessee, and the southern portion the lowlands, or the red lands. Each of them has impressed upon the surface its peculiar characteristics. A line drawn from about the centre of the eastern boundary of this county to its southwest corner, would mark the limit between the highlands and lowlands as nearly as could be done by a straight line. The highlands would be all north of this line, and their area would be about twice as great as that of the lowlands south of it. The general elevation, the rocks, the soil, the trees; in short, the physical features generally, distinguish clearly enough these areas from each other, though the passage from the one to the other is here more gradual, and less sharply defined than in Lauderdale county, since the southern edge of the highlands is not so much cut up into ridges and hollows. The average elevation of these highlands must be about 800 feet above Mobile bay, and some 200 feet above the lowlands. The western portion of this county is considerably more broken than the eastern, by reason of the deep, narrow ravines of the short tributaries of Elk river. The position along the dividing line between highlands and lowlands is more broken than that either north or south of it. The creeks of the western portion of this county, within the highlands, like those of Lauderdale county, are generally confined to deep and narrow gorges, but, as we go eastward, their basins become shallower, with gently sloping sides, and in these shallow basins, large, fertile areas, enclosed by a high rim, are not uncommon. The surface-rocks of these basins are the lower rocks of the "barren" group. Taken all in all, the bottom lands of the highlands form a very small per centage of the whole area. As any of the streams are approached, the country becomes more broken, and in case of the larger ones, bordering hills and ridges are encountered, furrowed and cut up in the usual manner. These hills, with their rich, red soils, produce well; but, like all the hills of this class, they are steep; cultivation is necessarily shallow, and the loose surface-soil is liable to be washed away by every freshet. Like all the streams within the highlands, these have clear waters, rapid currents, and rocky bottoms, either of loose pebbles or of bedded rocks. They are often bordered by bluffs which are natural sections of the rocks through which they have cut. As we go eastward, the red fertile spots of calcareous soils within the "barrens" increase both in extent and in number, being more numerous here than in Lauderdale, and more so in the eastern portion of this county than in the western. The "barrens" or highlands of this county, as a general thing, still support their native growth, and it is only in the creek bottoms and a few other localities that it has been cut down. The lowlands are reached from the highlands, usually, especially in the eastern part of the county, by a very gentle descent. These lowlands have a plain-like appearance, are somewhat rolling, with here and there slight elevations, gently rounded and affording agreeable variations of the otherwise rather monotonous scenery.

In this county the lowlands are included in a right-angled triangle, having the Tennessee river for its hypothenuse and the southern half of the eastern boundary of the county for its base; their limits are pretty well defined; they extend from the Tennessee on the south to the highlands on the north, and comprise, an area of about 125,000 acres. The northern boundary though usually distinct, is very irregular, forming great and sharp curves. The average height of the lowlands is 600 feet above the gulf of Mexico. Bedded rocks within this area are seldom seen and then only along creeks, or upon knolls, and ridges, The rocks of the highlands sometimes extend down into the lowlands, along the creeks, for several miles; nearly the whole of this area is now in a state of cultivation, a small portion being occupied by the lakelets and marshes bordering upon the Tennessee river, and a small portion along some of the creeks by the bottom lands subject to overflow, and a still smaller portion by the rocky points on some of the hills and ridges. The streams winding along through these lowlands, recognized at a distance by the line of trees which follow them, are approached by gentle descents, and often have their bottoms covered with pebbles. The lakelets and marshes, above spoken of, are surrounded by their native growth, but, with the exception of these lakelets, the creek banks, and an occasional grove covering a knoll, there are no woods found within the lowlands. Of the ridges in these lowlands, the only one of any prominence in the county is known as "Nubbin ridge," from its comparative sterility of soil. It is a high, broad and long ridge. It must be at least 75 feet above the average level of the surrounding lowlands; it is rolling or flat on top, varies in width from one to three miles, and extends along the eastern border of the county, in an almost due north and south line from the "barrens" on the north to within about four miles of the Tennessee on the south. It is not altogether, though mostly, within this county, a part of it being in Madison, the dividing line between the counties running along its top. Unlike most of the ridges of the same origin, but few of the loose cherty fragments cover its surface. It is now mostly lying out in old fields, grown up in bushes, etc., and many of these fields are deeply cut with gullies. There are some few spots upon the ridge of seemingly fair cotton land. On account of its pure water and atmosphere, and delightlul climate, this was once the place of residence of planters whose farms were situated in the more productive, though less salubrious, lowlands.

Scarcely any traces are now left of these residences.

Soils.—The soils of this county are of the same two characteristic varieties, already described, the light gray or yellowish gray siliceous soil of the highlands, and the red and loamy soil of the lowlands.

Springs.—Springs are numerous throughout this county, many of them of large size though they are not altogether so numerous or so large as those of Lauderdale. They are seldom met with along the level plains, either of the highlands or lowlands, but are most frequently seen flowing out from the banks and cliffs bordering the creeks and ravines. "Nubbin ridge" is especially noted in this respect; all along its sides, and at the heads of the ravines which cut into it, are to be found fine springs of pure water· In the northern portion of the county, along the outcroppings of the Black Shale formation, mineral springs, principally of Sulphur and Iron, often occur. The two best known of these medicinal springs are Sulphur springs, on Sulphur creek, some seven miles north of Athens, and Woolley or Milhous springs, in the northeastern portion of the county, on a small branch which empties into Little Limestone creek, and also on the Huntsville and Elkton road, some six miles south of the state line. These are both Sulphur springs, and were once noted summer resorts, though the former is now entirely abandoned and the latter, though still frequented, is fast following in its footsteps. Chalybeate springs nearly always accompany these Sulphur springs, running out of the same geological formation.

Forests.—The native growth of this county is about the same as that of Lauderdale. Its wooded lands are confined to nearly the same localities, though rather more abundant than in Lauderdale. There is also considerably more cleared land within the highlands in this county; the soil of the higher plains, being of a somewhat better nature, and the bottoms of much greater extent.

GEOLOGICAL FORMATIONS.

1. General Description.

The geological formations which occur in this county are the same as those of Lauderdale county, though no regular beds of superficial drift were seen. The rocks of these different formations were also very similar to those of the last named county, both as to quality and respective distribution, hence there remains but little to be said on this point.

Silurian and Devonian.—These rocks though of a very limited extent in this county, are still more numerous than in Lauderdale. They extend farther south, and down to a certain latitude are found on all the creeks, branchs, and ravines from the eastern to the western boundary of the county. Their average southern limit is about six miles south of the State line, though along the larger streams, such as Elk river, and Limestone creek, it is considerably further south. The Silurian rocks, represented by blue and gray limestones, often shaly, are exposed, along the deep valley of Elk river, as it enters the State, in beds of nearly one hundred feet thickness; everywhere else, their thickness is only a few feet. The Devonian rocks, represented by black shale and a dark, fine grained sandstone, were seen varying in thickness from one foot, to ten or twelve. The Black shale is known throughout this section of country as the "slate rock"; it occurs with great homogencity, thinly laminated, splitting up into small flakes, which strew the ground wherever it is found. It has a strong bituminous smell, especially when freshly broken, the fresh surface being of a very dark brown or black color, but becoming, on weathering, from presence of iron pyrites, a dirty reddish brown. No fossils were observed in it.

Sub-Carboniferous.

(1). *Lower Siliceous or Keokuk.*—Although the different beds composing this formation, presented in no two localities the same relative order of superposition, still they could always be easily recognized, by their general appearance, especially by the thin seams of flint or chert. These flinty seams varied in thickness from a few inches to as many feet; they were more regular and persistent in their occurrence than any of the other rocks of the formation, though in places they were seen passing gradually into a white siliceous clay, and in others, into a yellowish white, fine grained, soft sandstone, and in still others, into a shale. It is from the disintegration of these cherty or flinty portions that the light gray soil of the barrens has been derived.

(2). *Upper Siliceous or St. Louis Limestone.*—No bedded rocks of this formation were seen in the county, though doubtless they may be found in the bluffs near the Tennessee river. Their thickness in this county is not likely to be very great, probably less than one hundred feet, since within two or three miles of their northern boundary, rocks of the underlying formation, exposed in the gullies and ditches, were not more than five feet below the surface; and eight or ten miles south of this limit, not more than fifteen or twenty feet, as shown in the wells. The cherty nodules appear, as a general thing, to be more fossiliferous than the remaining purer portions of the limestone; being often nothing more than a mere mass of fossils, held together by siliceous matter. The fossils, themselves, are often cherty or flinty. On weathering, these cherty nodules become frequently, mere cellular masses, the fossils being entirely removed leaving their casts or impressions in the chert. The hills and ridges of the lowlands owe their existence to the protection afforded by these cherty portions of the limestone.

The only two towns within the county, namely: Athens and Mooreville, are built upon this formation. Athens, the county seat, surrounded by barrens on all sides except the southeast, is on the north or "barren", side of the general dividing line between the highlands and the lowlands, but is upon a narrow strip of red land running up from the southeast. Mooresville, built on a slight, red, cherty knoll on the east bank of Piney creek near its confluence with Limestone, is situated near the heart of these lowlands.

2. Details and Sections.

Silurian and Devonian.—The most southern point at which these rocks were seen in this county, or rather in this section of the State, was in S. 35, T. 2, R. 6, west, some seventy-five yards north of the Elk River Mills, on Blair's Ferry road, in the bed of a dry branch of one of the small ramifying ravines, of a larger one belonging to Elk River. They doubtless do crop out in spots south of the above locality, but of such out-crops we have no personal knowledge. The rocks at this place formed a small cascade in the branch, the bed of which, both above and below, was thickly covered with loose rock. The bedded rocks here seen, were as follows:

Section on Elk River.

Devonian.	(3). A reddish-gray, fine grained sandstone, covered with loose rocks, upper stratum of the cascade....	18 in.
	(2). Black Shale	2 ft.
Niagara.	(1). A blue limestone, forming bottom of little cascade, only the top of it showing.	

These rocks seem to have a slight dip to north-west; no other bedded rocks were seen near them, the slopes of the ridges on each side, being covered with loose rock, principally chert. The nearest place to the one just mentioned at which they were next seen, was in S. 18, T. 2, R. 5, west, (and hence, some three miles north-east,) on the east side of the river, nearly opposite the mouth of Sugar Creek, on a little branch just west of the residence of Mr. Jno. Beasley. They occurred along the bed of the branch for a distance of half a mile, and the lowest of them must be about fifty feet above the river.

The rocks here exposed were as follows:

Section near Elk River, Opposite mouth of Sugar Creek.

Lower Siliceous.	(9).	A loose conglomerate of fossiliferous, cherty pebbles.	
	(8).	A plastic yellowish-white clay, disintegrated chert, containing fossils	1 ft. 6 in.
Devonian.	(7).	A grayish-blue shale, completely decayed where exposed, called by the people "soap-stone," or "young slate."	1 ft.
	(6).	Black Shale, finely laminated, splitting up into large, very thin sheets	3 ft.
	(5).	A dark gray, shaly, fine grained sandstone	6 in.
	(4).	Black Shale	4 in.
	(3).	Same as (7)	6 in.
	(2).	A dark gray, fine grained sandstone	2 ft.
Niagara.	(1).	Shaly, gray, variegated, and dull colored limestones, regularly stratified	35 ft.
		Loose rock.	

These rocks seem to have a slight dip to south-west, which, taken in connection with the northerly dip of those previously mentioned, shows undulations in the strata.

The same rocks were also seen in the spring branch just in front of Mr. Beasley's house. Just south of this out-crop, and, I believe, just overlying it, are the high cliffs of ecrinital limestone to be hereafter mentioned. From here on to the State line, this Black Shale with its underlying rocks are exposed along nearly all the creeks and ravines. Some five or six miles north-east of the last named locality, on Redus' Creek, for a distance of three quarters of a mile up the creek, from the mill, the following rocks can be seen:

Section on Redus' Creek.

Lower Siliceous.	(1).	A light gray, cherty limestone, with thin seams of chert	15 ft.

Devonian.	(6).	Black Shale	2 ft.
	(5).	A soft, yellowish sandstone, turning below to a hard, compact rock, containing in spots much iron pyrites, and in others particles of mica	4 ft.
	(4).	Black Shale	8. in.
	(3).	Grayish-blue shale, so-called "soap-stone."	
Niagara.	(2).	A coarse, gray fossiliferous limestone.	
	(1).	A blue, fossiliferous limestone.	

No. (2) Forming the surface rock around the mill.

No. (1) Seen in creek below the mill; and,

No. (4) Seen in a little ravine, by side of the road, leading down to mill, from a westerly direction.

These rocks seem to have a slight dip toward to northwest. Near the school house, on the road leading up to Mr. Leggs' S. 26, T. 1, R. 5, west, were seen three or four seams of this Black Shale, varying in thickness from two or three inches to as many feet, and separated by thin seams of the fine grained, dark sandstone, and capped with a cherty conglomerate. These rocks dipped to southeast. Higher up this road, at least thirty feet above the last named conglomerate, the Black Shale again made its appearance, here intermixed with a yellow sandrock, sometimes grayish, becoming shaly towards top and very fossiliferous. The Black Shale as seen here in this road, was very tough, compact, and flexible, splitting up into very large sheets.

At Mr. Leggs' spring the following rocks were seen:

Lower Siliceous.	(9).	Clay and loose chert overlying a fossiliferous limestone.	Thickness undetermined.
Devonian.	(8).	Sandstone	4 ft.
	(7).	Black Shale	4 ft.
	(6).	Grayish-blue shale	3 ft.
	(5).	Seam of chert	3 in.
	(4).	Earth, strata not seen	10 ft.
	(5).	Same as (6)	3 ft.

Niagara.	(2). A yellowish looking, magnesian limestone........................	4 ft.
	(1). A variegated, siliceous looking limestone.	

These rocks must be some sixty or seventy-five feet above the river. Throughout the northern portion of the county, Elk River winds along a deep valley, from one to one and a half miles wide, bounded by high hills and ridges. These ridges and hills gradually slope off to the bottom lands below, and the lowest, or those nearest the river, present near their bases exposures of a light gray, siliceous, fossiliferous limestone. This limestone often contains brownish-red and blue spots, and becomes shaly or flaggy near the top of the slanting hills. Where the rock is shaly or laminated the surface is very rough and rugged, being covered with large slabs. Such spots are often overgrown with cedars. Farther from the river, back in the hills, the rocks overlying those just mentioned, are seen. Near the base they are light bluish-gray, siliceous, shaly limestones, lying in ledges, and (when appearing near the top of a hill or ridge) covered with loose chert. Still higher up, and farther back in the hills, there is seen a dark blue siliceous, fossiliferous limestone, covered by a soft, light, magnesian limestone. The light gray massive, shaly, and laminated siliceous limestones on the sides of the hills and ridges nearest to the river, are probably of the Nashville formation, Lower Silurian, whilst the rest are of the Niagara group, Upper Silurian. The soil of the comparatively level tracts of land lying along the river, formed from the disintregation of these lower siliceous limestones, appears to be very fine. The Black Shale crops out all along on the sides of the hills and ridges farthest back from the river, but in no place was it seen exposed to any considerable extent. It is believed by many of the inhabitants to indicate stone coal, and in more than one place, trial pits have been dug in search of coal. At the crossing of Sulphur Creek, so called from the springs which occur on it, near the Athens and Pettusville road, the following rocks are exposed:

Section on Sulphur Creek.

Lower Siliceous.	(10).	Soil, top.	
	(9).	A yellowish, sandy-looking clay, disintegrated chert	3 feet.
Divonian.	(8).	Black shale	4 "
	(7).	Soft, grayish blue shale, so-called "young slate"	2½ "
	(6).	Soil and loose rock—strata not seen	3 "
Silurian.	(5).	A very fossiliferous, grayish blue, siliceous limestone	18 in.
	(4).	A deep blue fossiliferous limestone	18 "
	(3).	A dirty looking limestone, containing shells, shaly below	10 "
	(2).	A deep blue limestone	18 "
	(1).	A gray limestone	10 feet.

The dip of these beds could not be determined. The Black Shale was also seen in the northeastern portion of the county, on Limestone creek, at the ford on the Huntsville and Elkton road, both in the creek and on the northern bank, in a seam some ten or twelve feet thick. The same rocks are said to occur some five or six miles down the creek, below this crossing. They are the rocks from which flow Milhous or Woolley Springs.

Sub-Carboniferous.

(1). *Lower Siliceous or Keokuk.*—The road from Huntsville to Athens, within the limits of this county, runs along near the southern edge of this formation, being partly over beds of this age, and partly over those of the St. Louis limestone. Near Piney creek, regular beds of stratified chert were seen in the road, weathering in places to a fine grained, soft sandstone, and in others, to a white siliceous clay. These strata were from ten to twelve inches thick. Separating Piney and Swan creeks is a slightly elevated ridge, composed principally of cherty pebbles, extending some two miles south of the above road. On Limestone creek, a large basin, from three to four miles broad in all directions, has been formed by the removal of the siliceous crust forming the "barrens." In some places the rocks, it is said, have been cut through down to the underlying Black Shale. The lands of this basin were once very fine, but now they are much worn, and there are many old fields lying out in sedge grass and bushes. The country along Limestone, north of this basin, is very much broken. On Little Limestone, half a mile above Woolley Springs, there occurs a low bluff of cherty, argillaceous, dull-colored limestone, highly fossiliferous, and the loose cherty nodules covering its hill-sides were little else than masses of shells and other fossils. No Black Shale has been noticed on this creek, though it occurs all along Big Limestone. Forming the bed of a dry branch, just north of Buck-eye road, near Athens, was a cherty conglomerate, made up of fossiliferous chert, held together by iron oxide. Along the road from Athens to Brown's ferry, within the "barrens," there occurs some fine timber. On the hill-sides, regular strata were observed of slightly fossiliferous chert, weathering into a soft yellowish, argillaceous, siliceous mass. Angular cherty pebbles are abundant along this road. On the Mooresville and Fort Hampton road, near the crossing of Poplar creek, the cherty rocks of this foundation were seen in gullies in regular strata, overlaid by four or five feet of red earth. The river hills extend out from Elk river about a mile and a half. They are considered very productive, but not good for cotton on account of liability to rust. By many, who have faith in the "divining rod," these hills are believed to contain ores of the precious metals. Of course, no one with a trace of geological information, would look for such ores in this position. In the little ravines, separating these hills, many fine oaks and poplars are to be seen. The Blair's Ferry, or Elk River Mills road, from Rodgersville, soon after entering this county, strikes the river hills, and thence on meanders along the narrow valleys with fertile soils. The sides of these valleys are often made by cliffs of fossiliferous and shaly cherty limestone, from which flow many fine springs. Just beyond Lanceville, on the Elk River Mills road, large blocks were observed, ten or fifteen feet square, of the siliceous limestone of this formation. Along the eastern bank of Elk river, both above and below the mill, are very high cliffs of crinoidal limestone, at least 125 feet above the river, though about 60 feet of this height, at the base, were hidden by earth and debris. These cliffs were very similar in appearance to that seen on the western bank of Blue Water at the State line. The crinoidal limestone was exposed here in greater thickness than at any other locality examined. These bluffs are not continuous, but are separated by deep, narrow gorges, down which flow the short, rapid streams. The country above the cliffs was comparatively level, the soil red and fertile, though of no great depth, as shown by the cherty rocks in the gullies.

The Athens and Pettusville road to about the sixth mile post from Athens, passes, for the most part, through the "barrens," covered principally with a growth of short-leaf pine, though, in spots, some good sized white oak trees are found. The few scattering oaks that were originally intermixed with these pines have mostly been cut out, leaving an undergrowth almost entirely of dwarf oaks. The little hills within these barrens are covered with cherty pebbles. Between the sixth and eighth mile post, on Sulphur creek, this road passes through a large body of red land, probably derived from the disintegration of the lower rocks of this formation. In the portion bordering upon Sulphur creek, this red land has been washed into huge gullies.

(2). *Upper Siliceous, or St. Louis Limestone.*—The rocks of this formation make the county, between the lower limit of the "barrens," as above laid down, and the Tennessee river. This part of the county is generally under cultivation, and what has been said upon this head in the general description above will suffice, since no detailed sections of the St. Louis beds have been obtained.

The long, narrow lakelets bordering upon, and parallel with, the Tennessee, in the southern part of the county, form a somewhat peculiar topographical feature. These bodies of water are seldom more than a mile and a half from the river. Occasionally they are doubled, the outer, in such cases, being usually connected with the river at both ends, the inner communicating with the river at one end only.

MADISON COUNTY.

TOPOGRAPHY, ETC.

This county, together with Limestone, occupies the central portion, in an east and west direction, of the section under consideration. It lies between the State of Tennessee on the north, and the river Tennessee on the south, and between the county of Jackson and Paint Rock River on the east, and Limestone county and the Tennessee River on the west. It thus comprises an area of nearly 800 square miles or more than 500,000 acres. Its southern boundary, being formed by the Tennessee River, flowing in a general north of west direction, is by no means straight, the river along this portion of its course, being especially crooked and considerably north of its general direction. Reaching up into the county by two large bends, it causes the eastern border to be some eight miles and the western some three miles broader, from north to south, than the central portion. The eastern boundary of this county is also very crooked; that portion of it bordering upon Jackson county being made to run, principally, along the top of the great divide between the waters of Flint and Paint Rock Rivers, and the rest of it being formed by Paint Rock River itself, a very crooked stream.

Drainage—As Madison county is upon the southern slope of a great water shed, all the streams of the county flow southward into the Tennessee River.

Flint River is the principal stream flowing through Madison, and together with its tributaries, it drains two-thirds of the county. Below its confluence with Hurricane Fork, twenty miles from its mouth, it receives no tributary of any considerable size; but above this point in the northern half of the county, it spreads out by means of its tributaries, Barren Fork, Mountain Fork, Brier Fork, and Hurricane Fork, and embraces within its drainage area nearly the whole width of the county east and west. Of these streams the two largest, Barren and Brier Forks, are western tributaries; the other two are eastern. Barren Fork, the largest of them all, rises in Tennessee, and, entering this county near the middle of the northern boundary, flows southeasterly, for the most part along "barrens," for some twelve miles, where it meets with Mountain Fork. The latter having its sources, principally, in the springs of the narrow fertile valleys lying between the mountain spurs of the northeast corner of the county, flows a general southwesterly direction, or nearly at right angles to Barren Fork, until the two come together. It is bordered throughout the most of its course by rich lands.

Flint River, proper, below the confluence of these two streams, has a general north and south course to its mouth, a distance equal to three-fourths of the length of the county in this direction.

Brier Fork, rising in the central portion of the northwest fourth of the county, in the "barrens," keeps a general southeasterly direction, and hence runs more or less parallel to Barren Fork and about four miles distant from it, until it empties into the river some five miles below the confluence of Mountain and Barren Forks. It receives its greatest tributary, Beaver Dam Creek, about three miles above its mouth.

Hurricane Fork, the smallest and most southern of the above named streams, has its sources in the narrow valleys between the mountain spurs of the eastern edge of the county. This stream runs for the most of its length in a southerly direction, along the eastern border of the county, through narrow fertile valleys, emptying into Flint, as we have already said, about twenty miles above the mouth of the latter. From the confluence of Hurricane Fork to its own mouth, Flint River flows between the spurs and mountains of the Cumberland range, with a bottom of an average width of about three miles.

The next in importance to Flint River though it drains only about one-fourth of the area, is Indian Creek. Indian creek, proper, reckoned from the fork of Price's Creek and the Huntsville Spring Creek to its mouth, is only a few miles in length. Its greatest tributary, Price's Creek, commonly goes by the name of Indian Creek. Through its branches, this Creek drains all the southwestern fourth and most fertile portion of the county. Its principal tributaries are Price's Creek, Huntsville Spring Creek, and Barren Creek. Price's Creek, the largest of these, takes its rise in the large springs near the central portion of the western half of the county, and flows an almost due south course until it meets the Huntsville Spring Creek some two miles from the Tennessee River.

The Huntsville Spring Creek, supplied by the *big springs* in and around Huntsville, (as the Huntsville spring, Brahan's spring, &c.,) flows generally southwest to its confluence with Price's Creek. Both of these creeks are fed along their lengths by *big springs.* Indian Creek, below the confluence of the two above named streams, runs a little west of south, until within about one-fourth of a mile of the river when it is deflected to the west, following the river and parallel to it, something over two miles, to the town of Triana, where it empties into the river. Barren Creek, the only other tributary of Indian Creek, of any size, and also the smallest and most westerly of the three mentioned, takes its rise partly in this county, and partly in Limestone, in the springs along the eastern edge of *Nubbin Ridge*, northwest of the town of Madison. It flows into Indian Creek, about one mile above the mouth of the latter.

We have thus seen, that Flint River and Indian Creek, with their tributaries, leave but little of this county to be drained by other streams. A small portion along the western border of the northwestern corner of the county, is drained by the head waters of Limestone Creek, a still smaller portion, in the southeast corner,by Paint Rock River, and another small portion, lying between the Huntsville meridian and the Huntsville mountain, by Aldridge Creek.

General Configuration.—As many of the mountain spurs and isolated peaks, in which the great Cumberland plateau ends, are within the limits of this county, the scenery is greatly varied. The rim of the monntain plateau in the eastern part of the county, is of very irregular outline, being deeply gapped by numerous coves.

In the western part of the county, the surface is undulating or rolling; high and broken in the northern portion, and generally low and flat, with occasional mountainous elevations on the south.

All these irregularities of surface are due solely to the denuding power of water, as the horizontal bedding of the rocks testifies.

From many of the elevated points, the views are grand.

This county can, perhaps, best be described by dividing it into four parts by lines running north and south, and east and west.

The Northeast Fourth.—This quarter is drained by the four forks of Flint River. It is mountainous on the east, with barrens on the north, and level and rolling country in the central and southwestern portions. The spurs of the mountain on the east extend westward four to eight miles from its eastern boundary. The narrow valleys between these spurs are fine lands, and down them flow the numerous small streams forming the head waters of Mountain and Hurricane Forks. The barrens on the north as a body extend down into the fork between Mountain and Barren Forks, and *in spots* are found throughout this whole division, especially along the creeks and low places. West of Barren Fork, away from the creek, in this division, there are no barrens of any consequence. Along Barren Fork, and east of it, there is much low, flat, swampy land of this kind. East of Hester Creek, the largest tributary of Mountain Fork, and especially adjacent to the creek, the country is very broken, and with little or no bottom land.

The rolling red lands of the central and southwestern portions of this division, extend up the Huntsville meridian, almost to the State line, and along the foot of the spurs of mountain on the east, they form a narrow strip, clear through to the Tennessee. Not very far to the north and east of the center of this division, is the town of New Market, situated on Mountain Fork, and surrounded principally by the rolling lands above named.

Northwest Fourth.—The eastern half of this quarter is drained by Brier Fork, and its largest tributary, Beaver Dam Creek, and the western half, by the head waters of Limestone Creek. A line drawn from the northeast to the southwest corner of this division, would separate it into two equal portions, very unlike in all particulars. That on the north or northwest side of the line, would consist for the most part of "barrens" or highlands, with very rough and broken surface; that on the south or southeast side, principally, of the red, rolling lands or lowlands, as heretofore designated, with an occasional barren spot near the dividing line, and a few mountain ridges and peaks in the southern portion. Along the Huntsville meridian, as already stated, these red or rolling lands extend up to the State line, and between the head waters of Limestone and Beaver Dam Creeks, they extend up into the "barrens," forming the divide. The peaks of the southern portion are more or less round, and about one mile in diameter. Many of the smaller ridges, though mountainous, show no bedded rocks at all. They are covered with small, loose, cherty fragments, embedding occasionally, near the top, large masses of limestone.

On these summits, limesinks and ponds are sometimes found.

The land at the bases of these spurs and ridges, and in the valleys which separate them, is usually quite fertile.

Southwest Fourth.—This quarter is drained entirely by Indian Creek and its tributaries. In a general way, it is high and rolling on the north, and low, flat, and gently undulating on the south. The isolated mountainous peaks which form a part of its surface, relieve the monotony of the scenery. In the southern portion there are lage level areas of prairie-like lands. Taken all in all, it is the most fertile position of the country, and, with the exception of the parts covered by the mountains and the low, flat, swampy lands, it is almost entirely in state of cultivation. This division is noted for its *big springs* and lime sinks. Some of the larger of these sinks near the river are supposed to be connected with the river subterraneously, since they are affected by its rise and fall. Ponds are also numerous throughout the southern portion of this division.

Southeast Fourth.—This quarter is drained almost entirely by Flint River, which flows from north to south, nearly through the center of the division.

Paint Rock River drains a small area in the southeast corner, and Aldridge Creek, a still smaller area south of Huntsville, lying between the Huntsville mountain and the meridian of that city.

In general terms, this division consists of two high mountainous areas, separated by the narrow valley of Flint River.

The eastern part between Flint and Paint Rock Rivers, has been cut up by erosion into a number of disconnected mountain peaks, whilst the western ridge which is a prolongation of the Huntsville mountain, is continuous along the summit, though much indented on the eastern side by fertile coves, which are offshoots of the Flint River valley.

The detached spurs of the eastern border, are similarly separated by large fertile areas of the same nature as the main valley.

Along the Tennessee River where it forms the southern boundary of this division, the mountains are close to the river, leaving very little of the lowlands between.

When Paint Rock River has cut through these mountains in the southeastern corner of the division, its banks are perpendicular cliffs, some five hundred feet in height.

Soils.—There are three distinct varieties of soil in this county, with of course, all the intermediate grades, resulting from their admixtures.

(1) The red soil of the low lands, rolling lands, and mountain sides, derived principally from the disintegration of the St. Louis limestone.

(2) The light, gray and yellowish gray siliceous soil of the "barrens" or true highlands, formed by the disintegration of the cherty portions of the Lower Siliceous rocks.

(3) The light and yellowish gray sandy soils of the plateaus covering the tops of the mountains, from disintegration of sandstones and conglomerates of the Coal Measures.

No. (1) covers most of the county, and forms the greater part of its farming or rich lands. Though principally derived from the St. Louis Limestone, some little of it may be from the overlying Mountain Limestone, and a still smaller portion from the underlying Lower Siliceous rocks. This variety of soil forms all the low level areas, down to the Tennessee; it covers also the bases of the many mountain spurs, extending sometimes high up their sides, even covering entirely the smaller ridges. In proportion to the amount of organic matter present, the soils vary in color from the black loam of the river and creek bottoms to the deep red clay of the mountain and hill sides. The subsoil is always red. The reddish and brown varieties though generally looked upon as cotton lands are also good for nearly all the grain crops, and different varieties of grasses. The black loam of the bottoms is especially suited to corn.

No. (2) next in importance to No. (1), is confined prin cipally to the northern portion of the county, and especially to the northwestern corner and to the country between Barren Fork and Hester Creek. Wherever this soil forms the surface, the country is, comparatively speaking, but thinly settled and little under cultivation. It is generally looked upon as poor or unproductive, but by admixture of the red clay of No. (1) and organic matter, it is improved, as is shown in those places where the two varieties of soil have been mixed by the washing from the red lands above. It has already been stated, under Limestone county, that with deep ploughing and a suitable compost, this can be made a fine cotton soil.

No. (3) the least in importance of the three general varieties mentioned, covers a very small proportion of the area of the county. It is found only along the level plateaus forming the tops of the mountains, and being also very poor, is of very little importance agriculturally.

Forests.—The wooded lands of Madison county are confined for the most part, to the high lands, or "barrens" and mountains, though they occur along the creeks and over the marshes and swamps of the low lands. The kinds of growth characterizing these different areas, have been given elsewhere.

Springs.—This county is especially noted for its *big springs* which occur in all the level and rolling areas. They are produced by the coming to light or emergence of large underground streams, and either flow from beneath small hills or bluffs, or boil up from large, deep, well-like holes, or in numerous small springs, distributed over small basin-shaped depressions which are usually covered by their waters. In whatever way they appear, they immediately run off as large creeks. The best known of these *big springs* is *The Huntsville Big Spring*, though there are others within a few miles of this which furnish equally as much, if not more water. *The Huntsville Big Spring* flows from under a bluff 50 to 75 feet high, on the brink of which, overlooking the spring is The Northern Bank of Alabama and other buildings on the western side of the public square. From this spring, the city is supplied with water. The waters run off in a stream which in former days, was navigated by boats carrying cotton to the Tennessee River. The temperature of the water in the month of June, according to Prof. Tuomey, was 60.8° F. whilst that of the atmosphere was 80.6° F. The coldest spring water known in the State, is found on the side of Monte Sano, not very far from its top, and at least eight hundred feet above the Huntsville Big Spring. The temperature of this water in the month of July, according to Prof. Tuomey, was 55.4° F. whilst that of the atmosphere was 80.6° F. At about the same altitude as the last named spring, there occur on the side of Monte Sano, numerous small chalybeate and alum springs running from the shales overlying the thin seams of coal.

Along the outcroppings of the bituminous shale in the northern portion of the county, sulphur springs are met with. One of these situated in S. 26, T. 1, R. 1, east, was once a place of resort, but like others of similar nature, it seems to have had its day of prosperity. Its water is very strongly impregnated. The best known mineral water in the county, is that of Johnson's Well in S. 26, T. 1, R. 1, west. This water has quite a reputation for its medicinal virtues, and is visited annually by the afflicted, not only of this county and State, but also of neighboring States.

Geological Formations.

General Description.

The following geological formations make up the surface area of this county; (1) Silurian, (2) Devonian, (3) Lower Siliceous, or Keokuk, (4) Upper Siliceous or St. Louis Limestone, (5) Mountain Limestone, (6) Coal Measures.

Silurian.—Though none of these rocks were seen in this county, there is very little reason to doubt that they do appear along the creeks near the State line.

Devonian.—This formation is represented in this county by a black bituminous shale, and is confined to the creeks and branches in northern portion of county, from Hester Creek, westward. The dark, fine grained sandstone associated with the Black Shale in Limestone and Lauderdale counties, was not noticed here. This rock, (Black Shale) seems not only to have increased in thickness, as we have come eastward, but also to have become more slaty and flexible. It doubtless extends southward, down into the county, along Flint River, some eight or nine miles. It was seen as far south as the site of the old McFarland Factory, on Mountain Fork, about one mile above its confluence with Barren Fork. Thickness at least ten feet.

Sub-Carboniferous.

(*1*) *Lower Siliceous or Keokuk.*—The rocks of this formation consist in this county, of flint or hornstone, a compact, fine grained sandstone, and a cherty limestone, the flint or hornstone occurring in starta from two or three, to twelve or eighteen inches in thickness. On being struck with a hammer it breaks into cubes or "diamonds" as they are sometimes called. None of the crinoidal limestones of this formation, so well developed in Limestone and Lauderdale counties, were seen in Madison. In this county, these rocks are much thinner than in Lauderdale and Limestone, and at the same time have lost many of the characteristic features, ther epresented. They are co-extensive with the "barrens" and hence, with few exceptions, especially along the creeks, are confined to the northern portion of the county. Along the creeks they extend down into the overlying formation or red lands; and along Fint River as far as the central portion of the county. The country formed by them is as a general thing much broken.

(*2*) *Upper Siliceous or St. Louis Limestone.*—Cherty limestones and thin seams of chert make up the rocks of this formation in this county. These rocks appear to be much more siliceous here than in the counties already described, making it difficult, in many places to distinguish them from the underlying rocks merely by their general appearance. The soil, too, derived from them, in many spots, resembles very much that of the "barrens," and supports the same natural growth. These rocks are of equal extent with the lowlands or red lands. Along the Huntsville meridian, and at the foot of the mountains in the northeast corner of the county, they extend in narrow strips, through to the State line on the north, and between the head waters of Limestone Creek and Brier Fork, they extend up into the "barrens," forming the divide. They form the sloping bases of all of the mountains, and cover the whole surface of some of the smaller detached ridges. These rocks are seldom seen in undisturbed beds, being generally much disintegrated. The cherty portions of the limestones, however, usually cover the sides and tops of the knolls and hills. Big Springs limesinks, and ponds are characteristic of this formation throughout North Alabama. Occasionally ponds are seen occupying shallow basins on the summits of the lower ridges of this section of the county.

Upon this formation all the towns in Madison county have been built. The average thickness of these beds in Madison is about 200 feet.

(3) *Mountain Limestone or Chester Group.*—This formation, in this county, is made up of various shades of blue, gray, and dull colored limestones, argillaceous and shaly limestones, and sandstones. They all seem to be more or less fossiliferous, and hold locally, beds of solitic crinoidal sparry and Magnesian limestons and, in a few instances, thin seams of chert. These rocks are found almost exclusively along the mountain sides, and covering the higher detached ridges and spurs, seldom extending down into the valleys. They vary very much in their relative positions, thicknesses, and composition; in no two places were the observed sections of these rocks identical. Whenever they

extend down into the lowlands they are at best, covered by a very thin coating of soil, being more frequently bare. The sandstones occur as a seam, or locally in several seams, separating the limestones, and usually forming a bench, or benches, along the sides of the mountains. These seams of sandstone, vary in number from one to three, and inthickness from a few feet to some twenty-five or thirty. This sandstone is known as the Lagrange sand-sandstone; it is for the most part a fine grained sandstone, often laminated, and containing impressions of coal plants, though in places it is coarse, soft and friable; besides forming the benches along the sides of the mountains, it sometimes makes the capping stone of some of the smaller detached ridges. The natural growth upon it, is so different from that of the limestones above and below it, that the lines of division can readily be distinguished at a distance. This sandstone was, in several instances, observed extending out into the fields near the base of the mountains and in the southeastern portion of the county, forming extensive level areas. The limestones above these seams of sandstone are finely displayed in the bluffs in the southeast corner of the county, near the mouth of Paint Rock River. Some of the limestones seem to be well suited to architectural purposes. Forming very little arable land, the rocks of the Chester Group are of very little importance agriculturally. They vary in thickness from 500 to 800 feet.

Coal Measures.—This formation here as elsewhere, consists of ferruginous conglomerates and sandstones, shales and coal. They occur only upon the highest lands, or mountains of the eastern half of the county. These level plateaus are covered with a poor sandy soil, divided from the sandstones and conglomerates of these measures. Upon the level summits of the mountains the underlying sandstones are often seen bare, and along the sides of ravines they usually form a line of cliffs. A similar line of cliffs, exposing often nearly the whole thickness of the formation, is generally seen around the edge of the plateaus. Near the foot of these cliffs, the seams of shale and coal make their appearance. Along with the shale and coal, there is often a thin seam of white clay which is a very good fire clay. From these shales and sandstones, flow numerous small alum and chalybeate springs. These seams of coal vary in number from one to three separated by shales and sandstones and from a few inches in thickness to about two feet. This coal as a general thing, burns very freely, though it contains a large per centage of ash and sulphur; on account of the thinness of the seams and their inaccessibility, this coal has been mined to a very limited extent in this county; except in one place on the side of Monte Sano. The rocks of this formation, in Madison county, show a maximum thickness of 150 to 200 feet.

2. Details and Sections.

Devonian or Black Shale.—This rock is said to occur all along Big Limestone Creek in the northwestern portion of county, forming small bluffs ten or twelve feet high. This seems probable as it occurs just within Limestone county on this creek, and was seen along the Huntsville and Upper Elkton road, just north of the creek in this county in great piles, doubtless hauled from the creek below. It was also observed in a seam, on the side of a hill some ten feet above a small spring branch running into this creek, in S. 29, T. 1, R. 2, W. The shale was here about eighteen inches in thickness; no other bedded rocks were seen near it. In the northern portion of the county, in S. 17, T. 1, R. 1, E., on Barren Fork of Flint, another outcrop was observed, four or five feet in thickness. It is said to occur on all the branches and creeks near the last named locality. It forms the bed of Hester Creek and a small branch near it, where crossed by the Limestone road, in S. 18, T. 1, R. 1, E. No other bedded rocks were here noticed near it. This is probably its most easterly occurrence in this county, or in North Alabama, outside of the anticlinal valley of the Tennessee. The most southern point at which it was seen in this county, was on Mountain Fork, about one mile above the mouth, at the site of the old McFarland Factory. It here covers the creek bottom and sides, just above where the old dam used to stand, for some two or three hundred yards. It was here heaped up along the banks in great piles, some of the thin slabs eight and ten feet in diameter. These piles were probably made by parties in search of "coal oil." Under the water or on a freshly broken surface, this shale was almost black, but, as seen on the bank, it was reddish brown in color, from the weathering of the large quantity of iron pyrites enclosed in it. This seam must be here at least ten feet thick. No other bedded rocks were exposed near it, the creek bottom and sides both above and below, being covered with loose gravel. This rock is said to occur also in the bed of Flint River, two miles south of the last named locality.

Lower Siliceous or Keokuk.—In the eastern portion of this county the upper rocks of this division are so blended with those of the overlying formation as to make it difficult or almost impossible, in places, to separate them. In the north-western and northern portion of the county, they are seen along the creeks and hillsides as seams of chert or hornstone, regularly stratified, the strata varying in thickness from a few inches to some ten or twelve. These flinty seams were often observed weathered, into a white siliceous powder. East of Hester Creek, extending out from it for about one mile, and down it to within a mile or so of its mouth are ridges, at the bases of which are the occurrences of Black Shale noticed above. These ridges have a mulatto soil, and are covered with angular cherty pebbles, probably derived from this formation. At the confluence of Barren and Mountain Forks, in the bed of the river, is a hard, dark blue cherty limestone of this formation in strata about six inches thick. This same cherty rock occurs in the creeks and branches, and forms the shoals in the river, near the mouth of Brier Fork. At the Bell Factory, one mile below the mouth of Brier

Fork, the upper portion of these rocks is composed of a compact, fine grained sandstone with cherty seams. (See section under St. Louis Limestone below.)

Upper Siliceous or St. Louis Limestone.—The lower rocks of this formation, seem to have become more siliceous, their cherty seams more numerous and thicker, as we have come eastward. These lower cherty rocks are displayed in the bluff above the Huntsville spring, and in the bluff near the mouth of Indian Creek, above the spring at Triana. Around Huntsville, these rocks are probably about 200 feet in thickness. As already stated above, undisturbed beds of this formation are comparatively rare, the limestones having generally been disintegrated, leaving the chert in angular fragments, with an occasional block of the limestone itself, covering the hill-sides and summits, and imbedded in the red soil. On the hill-sides, especially along much traveled roads, there are places perfectly white with siliceous dust from the weathering and wear of these cherty portions. The rocks scattered throughout the town of Triana, contain seams as well as nodules of chert. In these seams are numerous specimens of the well known fossil, *Lithostrotion Canadense.* The country all around Triana, extending out four and five miles from the river, is for the most part, low and gently rolling, with extensive areas of perfectly level land and occasional low, red knolls. It is dotted all over with numerous ponds and sinks, so characteristic of this formation. Along the southwestern edge of the county, extending down to within four miles of the river, is the ridge known in its northern portion as "Nubbin Ridge." From Price's Creek, up Rainbolt Mountain, the thickness of this formation was estimated at about two hundred feet. This mountain is about three miles long, in a north and south direction, and, so far as seen, consisted entirely of the rocks of this group. Where crossed by the Huntsville and Madison road, near its southern extremity, it was comparatively flat and about half a mile broad on top. Within a mile of this mountain on the northwest, the "barrens" set in.

In S. 32, T. 3, R. 1, W.; S. 22, T. 3, R. 1, W.; and in S. 20, T. 2, R. 1, W., are ridges, or low mountains, composed entirely of the rocks of this formation. Pond Mountain, one of these ridges, two miles northwest of Huntsville, receives its name from the fact that it has on top, a pond or lime sink.

Madison Cross Roads, properly within the "barrens," is situated on a high, level area between the head waters of Limestone and Beaver Dam Creeks, the surface of which is made by these rocks. Some of the high country around New Market, the soil of which has been derived from the more cherty portions of this formation, has very much the appearance of the "barrens," both as to soil and growth. At the Bell Factory, on Flint River, one mile below the mouth of Brier Fork, the following rocks were seen:

Section at Bell Factory, on Flint River.

Siliceous Group.	(2) Cherty limestone with layers of chert...........................	20 ft.
	(1) A compact fine grained sandstone, with seams of chert,	15 ft.

In this section, it was uncertain whether the rocks belong to the upper or lower division of the Siliceous Group.

Mountain Limestone or Chester Group.—In the spurs and ridges, west of the Huntsville Mountain, where these rocks form the capping stones and have been partly removed by erosion, they do not appear in so great a thickness as in the eastern half of the county where they have been protected by an overlying formation (the Coal Measures.) Where thus protected, they seem to have an average thickness of about 600 feet. A section of these rocks, as they appear on Monte Sano, is given by the State Geologist in his report of progress for 1877 and 1878, on page 21. From the lowest part of the valley near Huntsville, to the top of Russell's Hill, a detached mountainous spur, two miles west of Huntsville, the following section was taken:

Section near Huntsville.

(2) Mountain Limestone	(2) Shaly limestone	100 ft.
	(1) Bluish gray, compact limestone	75 ft.
(1) St. Louis limestone		200 ft.

The thicknesses of the different strata, are merely rough estimates. The upper portion of these rocks are finely displayed in the southeastern corner of the county, in Flat Rock bluff, a perpendicular cliff some two hundred and fifty feet high. This bluff is formed by Paint Rock River, where it cuts through the mountain, bordering on the Tennessee. It is the conterpart of Painted Rock bluff, just opposite to it across Paint Rock River. The top of the bluff is over five hundred feet above the Tennessee, which flows at its base. About four hundred feet of this height are formed by the rocks of this formation, the rest, by the sandstones and other strata of the Coal Measures. The face of the cliff is composed entirely of limestones, the intercolated seam of sandstone being beneath the debris at its foot, and the Coal Measures slanting off from its summit. The limestones are dark blue, bluish gray, and argillaceous, in places shaly and granular. A hard, bluish gray, cherty limestone, immediately underlying the carboniferous sandstone, forms the top of the perpendicular portion of the bluff. The rocks are regularly stratified, and are stained along the perpendicular face of the bluff in irregular patches, by oxide of iron, giving them a grotesque appearance. The seam of sandstone of this formation caps the majority of the higher detached peaks and spurs west of the Huntsville Mountain, and some of the lower ones in the northeast portion of county. It forms the summit of Capshaw Mountain, which is the most western locality of the occurrence of the rocks of the Chester group in Alabama, north of the Tennessee river. The mountain is a detached peak, rounded in shape, and about one mile in diameter. It is situated, principally, in S. 34, T. 2, R. 2, W., and has an elevation of 300 to 400 feet above the surrounding country. Considerably more than half of this height consists of the lower limestones of this formation with their capping sandstone.

In the southeastern quarter of the county, east of the Huntsville Mountain, this intermediate seam of sandstone, though generally seen near the foot of the mountains extending out a short distance only into the fields and lowlands, is sometimes found covering the low knobs and hills of the lowlands. Locally, it seems to be separated into two layers by a varying thickness of limestone, more or less shaly. The sandstone above the division, being flaggy and fine grained; whilst that below, is coarse, soft and friable, easily weathering into a coarse sand. The knoll on which the grave yard at Vienna is situated, is covered on top with fragments of this thin, flaggy sandstone, whilst the country all around it has a coarse, sandy soil, probably resulting from the disintegration of the lower coarse grained sandstones.

Along the southern side of the mountain, bordering upon the Tennessee and in S. 17, T. 5, R. 3, E., and Ss. 28 and 34, T. 4, R. 2, E., this sandstone was seen along the foot of the mountains extending a short distance out into the fields.

Much of the low, flat country northeast of Vienna, and between Keel and Gunter's Mountain, is formed from the lower rocks (below the sandstone) of this formation. These rocks are always near the surface and frequently crop out along level areas; they are light, gray, fossiliferous limestones, containing Pentremites. In S. 20, T. 5, R. 3, E., in a low, flat place, is a cave some twelve or fifteen feet deep, in these rocks, and at Vienna a large spring flows out of a hole, some ten by twenty feet, of unknown depth, surrounded by a grayish blue limestone. The same rocks were also seen along the low, flat bottoms of Flint River, a mile or so from its mouth, and near them numerous, huge sinks, mostly round and dry, and some fifteen feet in depth. The soil formed from these lower beds is said to be fine for grain, but not for cotton.

Coal Measures—The sandstones and other beds of this formation, cap the higher mountains in the eastern half of the county and to their protection is due the great elevation of these mountains, (1500 to 1600 feet above tide water.) The point of greatest elevation, judging from appearances, is a peak of the Huntsville mountains, about two miles east of Whitesburg. In this peak these rocks, doubtless, have a thickness of two hundred feet. The seams of coal are very irregular as to their thickness, in one place thinning down to a few inches, and in another thickening out to about two feet. In McKinney Mountain, (that portion of the Huntsville Mountain, between Flint River and Paint Rock River,) there are several seams of coal which are supposed to have an average thickness of twelve to fourteen inches. The coal on Keel Mountain which shows in many places, is about eighteen inches thick. This mountain has the usual line of cliffs around it, and from around these cliffs a fine grained sandstone is gotten, which is said to answer well as a whetstone. The highest points of the mountains in S. 2, 3, 12, T. 5, R. 2 east and S. 22, 26, 27, T. 4, R. 2 east, all contain coal near their tops.

JACKSON COUNTY.

This county is bounded on the north by the State of Tennessee, on the east by Georgia and DeKalb county, on the south by DeKalb and Marshall counties, and on the west by Marshall and Madison counties. It has an area of about 1115 square miles, or 713,000 acres.

Drainage.—All the streams of this county, like those of Lauderdale, Limestone and Madison, flow directly or indirectly into the Tennessee. The Tennessee entering the county near its northeast corner, flows nearly southwest to the southern boundary, a distance of about fifty miles. In this part of its course it is approximately parallel to the eastern boundary of the county and at an average distance of about eight miles from it.

In this part of the river, are the following islands of considerable size: Long Island, Crow Town Island and Bellefonte Island.

The streams flowing into the Tennessee from the northeast side are, beginning above, Jones', Widow's, Big Crow, Mud, Rosebury and North Sauty Creeks. Of these, the most important is Big Crow Creek, formed by the confluence of Little Crow, Big and Little Raccoon Creeks. Little Crow and Big Raccoon Creeks both rise in the highlands of Tennessee; the others have their head waters in Alabama.

On the other side of the Tennessee, on Long Island, South Little Raccoon, Riley and South Sauty Creeks. These are all comparatively short streams. South Sauty forms part of the southern boundary of the county.

Paint Rock River flows into the Tennessee beyond the limits of Jackson county, and hence, so far as this county is concerned, may be considered an independent stream. Its principal tributaries on the west, are Estelle, Larkins, Lick, Dry and Clear Creeks; those on the east, are Hurricane and Guess Creeks. From the number of the streams given above, it will be seen that the county is well drained; the only marshes or ill-drained areas being in the lowlands near the mouth of the creeks in the southern part of the county.

General Configuration—The surface of this county is much broken, and its scenery correspondingly diversified.

In general terms, it consists of high mountainous tracts, level on top, and separated by narrow valleys with steep slopes.

The anticlinal valley down which the Tennessee River flows, separates the mountainous eastern portion of the county into two parts—Raccoon Mountain on the southeast, and the Cumberland spurs on the northwest.

This valley has an average width of about four miles, the greater part of this area being north of the river, leaving only a narrow strip on the other side.

The edge of the valley on the north side is very irregular; deeply indented by coves of nearly level fertile land. These coves, cut back into the highlands, have formed gaps in the northern rim of the valley, and produced a row of hills (sometimes several rows) called river hills, running approximately parallel to the river, and lying between the true river bottom, and the higher level areas away from the river. Near the river where denudation has produced its greatest effects, those parts of the highlands, already mentioned as separating the coves, have in many instances been cut across by side ravines, and in this way, more or less completely separated from the main body of the Cumberland table lands. The river hills are usually of this character.

Further back, and generally north of the line of the Memphis and Charleston Railroad, it is usual to find the summits of the highlands lying between the water courses, continuous with that of the great Cumberland plateau of Tennessee.

A line of cliffs near the summit makes the ascent of these spurs exceedingly difficult, and in this part of the county, it is possible to cross these ridges, only by making wide detours, following the courses of the streams, ascending the plateau near their head waters, crossing the level areas on these summits and making the descent along a parallel water course..

South of the Tennessee, Raccoon Mountain faces the river with a line of cliffs almost continuous throughout its entire length, leaving a narrow strip only of bottom land at the base of the mountain.

With this exception, the whole of Jackson county south of the Tennessee is formed by Raccoon Mountain.

Along this line of the cliffs the points are few at which the mountain can be ascended, and the roads usually lead up by gradual slopes, or tortuous zig-zags, cut out along the mountain side. When the top is reached, we find the usual level plateau, very broad in this instance, extending beyond the eastern limits of the county. The monotony of the scenery of this plateau is relieved somewhat by occasional shallow ravines and low places, along which the creeks and spring branches run, and which are sometimes covered with very luxuriant ferns. Where these creeks leave the mountain plateau they have usually cut back into it deep narrow gorges, which present, especially near their heads, many wild and picturesque sights. Standing at the head of one of these defiles, on some prominent, projecting point, one often overlooks a scene well worthy of being portrayed on canvass. The mountain plateaus are from 1800 to 2000 feet above the sea, and from 800 to 1000 feet above the valleys below.

Forests.—The greater part of this county is still covered by its native growth, consisting of oak, pine, cedar, hickory, gum, chestnut, poplar, walnut, etc., the cleared and cultivated lands being confined, principally, to the level and rolling areas along the Memphis and Charleston Railroad, and to the coves, and river and creek bottoms.

Soils.—The soils of this county present about the same varieties as those of Madison, though they are not derived altogether from the same kind of rocks. These soils are comprised within the following general classes:

(1) The red, brown, and black soils, of the mountain and hill sides, of the level and rolling lands, and of the river and creek bottoms. The soils of this class are derived from the disintegration of the rocks of the Mountain Limestone, Siliceous groups, and Upper and Lower Silurian formations.

(2) The sandy and light gray siliceous soils, covering some of the creek bottoms and some of the slopes near the foot of the mountains. These soils are formed by the weathering of the sandy seam of the Mountain Limestone and the cherty portions of the Siliceous groups. In this class might also be included the light gray and gravelly soils of the ridges running parallel to Tennessee on the north, and formed from the disintegration of the cherty portions of the Knox Dolomite.

(3) The light and yellowish gray sandy soils covering the level plateaus on the tops of the mountains. Soils of this class are derived from the rocks of the Coal Measures.

No. (1) forms the rich and fertile lands, which are principally in a state of cultivation, and hence are, from an agricultural stand point, the most important. They also rank second as to extent.

No. (2) are of very little importance from any standpoint.

No. (3) are worthy of consideration only from the fact that they cover by far the greater part of the county.

Springs.—This county, like Madison, has many *big springs.* These springs differ from the *big springs* of the counties towards the west, in that the majority of them flow from the rocks of the Mountain Limestone, and are seldom seen boiling up in the low, flat places. They occur along the foot of the mountains and especially near the heads of the deep coves.

They are often accompanied by coves, which sometimes lead back to subterranean lakes. Small springs are found in nearly all parts of the county, and in some localities they are so numerous and so close together as to send off immediately their combined waters in creeks of considerable size. Even along the plateaus covering the tops of the mountains, there are many of these small springs, a good proportion of which are more or less chalybeate. There are sections along the Tennessee river in which good drinking water is not to be had, but everywhere else in the county it seems to be abundant.

Geological Formations.

1. *General Description.*

Of all the counties of North Alabama, this is of the greatest interest geologically, on account of the great variety in the rocks of which its surface is formed.

This variety is in great measure due to the cutting out by erosion, of the anticlinal valley or trough, down which the Tennessee river flows.

The geological formations here exposed, are, in the order of their superposition:

(5) Carboniferous.	Coal Measures.
(4) Sub-Carboniferous.	Mountain Limestone or Chester group. Upper and Lower Siliceous. (St. Louis, and Keokuk groups.
(3) Devonian.	Black Shale.
(2) Upper Silurian.	Clinton or Red Mountain: Dyestone of Tennessee.
(1) Lower Silurian.	Trenton and Nashville. Quebec (Knox) Dolomite.

Quebec or Knox Dolomite—The rocks of this formation in Jackson, consist of blue and gray dolomites and limestones, cherty limestones, and cherty pebbles and nodules. There were also seen associated with these rocks a small quantity of Iron ore, (limonite), Iron conglomerate, and a few small sand rocks. Some of the massive dolomites and limestones are granular, and others, oolitic; and some of them contain streaks of calcite. These rocks are found in this county only along the anticlinal trough or Tennessee valley. Except in the extreme northern portion of the county, north of Bridgeport and the M. and C. R. R., they occur only on the west side of the river, and not very far from the western limit of the valley.

They are confined to a strip between one and two miles in width, in this valley. The trend of these beds is N. N. E., parallel with the course of the valley except near the northeastern corner of the county where the strike turns more towards the east. The dip is usually at a high angle, either N. W. or S. E., in some cases nearly perpendicular.

The part of the valley formed by these rocks is generally a series of ridges, which are mostly made up of chert and covered with a light gray soil,.with angular fragments of chert, and supporting a growth of stunted pines and occasional hickories.

Here, as elsewhere, this is one of the chief iron ore bearing formations and in many parts of the county accumulations of limonite (almost ore banks), are met with.

Near the river these ridges are covered generally with rounded quartz pebbles.

The purer dolomites and limestones of this formation are usually found on the western side of the cherty ridges mentioned.

They are generally covered ~~with~~ a thin coating of soil, and when the soil is nearly wanting, they form rocky knolls, usually covered by a growth of cedar.

Trenton and Nashville—The rocks of these formations are shaly limestones above, and dark blue and dove colored limestones below. The shaly limestones constituting the greater bulk, the blue and dove colored limestones becoming more or less shaly on weathering. All of these rocks are argillaceous, and some of them, especially the shales, sandy.

The shaly portions upon weathering assume an ashy color, and in them ripple marks and *graptolites* are abundant. The dark blue massive variety often contains streaks or thin seams of calcite. These rocks overlie beds of the Knox Dolomite, and like them are inclined, though at not so great an angle. They were observed only immediately along the Tennessee, as a southeast border to the above named cherty ridges, forming principally the narrow bottom of the river, and occasionally low bluffs along the banks. These bluffs usually terminate above in slightly elevated rocky knolls covered with red cedar. Thickness, about 200 feet.

Clinton—These rocks consist of limestones, sandstones, and shales. The limestones are all in thin seams, and more or less shaly and sandy. Many of the seams of shaly and laminated limestones are stained with iron, and are separated along the outcrops, by beds of a deep red loam, which hide the underlying rocks. The sandstones occur principally, as the lower beds of this subdivision, and are of a yellowish gray color, becoming more or less shaly on weathering. The shales are variegated and sandy. The rocks of this formation, as seen in this county, have all considerable dip. They occur only along the anticlinal valley of the east. Their thickness is estimated at about 125 feet.

Black Shale—This formation was observed in one locality only, viz., on the northwest side of the ridge opposite to or east of Bridgeport, between Bridgeport and Raccoon Mountain.

Lower and Upper Siliceous—Westward in Lauderdale, Limestone and Madison counties, these two subdivisions of the Lower Subcarboniferons formation, present usually characteristics by which they can readily be distinguished. In Jackson county, however, these distinctions are to a great extent lost, and the whole Lower Subcarboniferous group becomes siliceous or cherty throughout, and at the same time, considerably thinner than the corresponding beds westward. The two groups, are therefore here considered together.

They consist of impure limestones with chert or hornstone, the chert often forming ridges in the anticlinal valley.

Beyond the limits of this valley they are approximately horizontal in bedding, and form most of the level rolling lands of the county.

As usual, these rocks are characterized by limesinks and ponds.

The thickness, varies greatly in different parts of the county.

Mountain Limestone.—This formation, composed of limestones, sandstones, and shales, occurs principally along the mountain sides, though it sometimes extends down into the valleys. The limestones are blue, gray, and dove-colored, and are usually more or less fossiliferous. Some of the limestones are argillaceous, and contain chert both in thin seams and nodules; other varieties are sparry, others are crinoidal, and others still are oolitic. Some of them are traversed by streaks, or contain cavities of calcite, and occasionally of quartz. The shales are more or less variegated and fossiliferous. The sandstones are both laminated and massive. The laminated portions are fine grained, compact, and hard; the massive varieties are coarse grained, loose, and friable. The beds making up this formation vary very considerably as regards their relative thicknesses, position, and composition. The seam of sandstone appears to be always present, though sometimes near the bottom of the formation; sometimes thin, sometimes in several distinct beds, separated by limestone. The strata have usually very slight, if any, dip. Caves are of frequent occurrence, and from some considerable quantities of nitre have been obtained. The minimum thickness is perhaps about 700 feet thick.

Coal Measures.—These measures, as stated under Madison county, are composed of sandstones, conglomerates, shales, and coal. They are similarly situated to those of Madison, though, in this county, they are of much greater extent both as regards thickness and superficial area. They are the uppermost or newest rocks of the county. They lie on or above the Mountain Limestone, and form the tops of the broad, plateau-like mountains. These rocks are of importance, principally, on account of their extent, forming about two-thirds of the county, and on account of their being the depository of all the stone coal. In some places this coal occurs in three different seams, one above the other. These seams are separated by sandstones and shales, the lowest seam cropping out usually near the foot of the line of cliffs. The coal of these seams varies very much as to quality and thickness. In some places it is very pure, and in others the reverse; and in some places it is said to be six and seven feet in thickness, whilst in others it is only a few inches. In only two or three places has it been mined to an extent beyond that of supplying the needs of the neighboring blacksmiths. The thickness of this formation in Jackson county is about 200 feet.

2. DETAILS.

Quebec Dolomite (*Knox Dolomite of Tennessee*).—The cherty ridges alluded to above contain the greater part of the rocks of this formation. In some few instances dolomites and limestones of this group were observed in low places where the covering soil had been removed.

Together with the angular fragments of chert (characterized usually, as Prof. Safford has observed, by the presence of rhombohedral cavities), these ridges are partly covered with water-worn pebbles of white quartz.

The ridges, as already stated, are made up of the debris resulting from the disintegration of the cherty limestones or dolomites, where the calcareous portions have been removed, leaving the siliceous fragments in a confused mass, hiding completely any of the bedded rocks which may lie beneath. For this reason exposures of the original strata are not often seen in the ridges.

Below are given some localities where the dolomites and limestones make their appearance: About a quarter of a mile northeast of the steamboat landing, opposite Bridgeport, across the railroad, a yellowish-gray, hard, cherty limestone occurs. This rock dips southeast at an angle of about 60°, and weathers into a light-grayish shale. About a mile and a half northeast of this locality, a short distance north of Carpenter's station, near the corner of sections, 2, 3, 10, and 11, T. 1, R. 9, E., a hard flinty or cherty argillaceous limestone, traversed by streaks of calcite, makes its appearance on the hill-sides and in gullies, some 15 feet thickness exposed. The dip southeast, about 20°.

Near Stevenson, the rocks of this formation appear to lie in close juxtaposition to the Mountain Limestone, as if separated by a fault.

In this vicinity, near Advent Church, a section was obtained showing some of these bedded rocks lying close to the Mountain Limestone.

In S. 14, T. 1, R. 83, the same beds are seen.

Trenton and Nashville of Tennessee Report.—These beds were observed only along the river, southeast of the cherty ridges above mentioned.

About half a mile below Bridgeport, down the river from this station, they form a bluff some 40 feet high on the western bank of the river. The rocks here exposed were buff and dove-colored argillaceous limestones. These rocks are very fossiliferous, containing graptolites, and showing ripple marks in abundance. Along the bluff there were bands of a light and a dark ashy gray color, due to weathering of these rocks into shale. They have a dip of about 25° to southeast. A bluff on the west bank of the river, just below Caperton's Ferry, which is in S. 28, T. 2, R. 8, E., is composed of the following rocks:

Section at Caperton's Ferry.

Nashville and Trenton	(4) A dark blue fossiliferous and argillaceous limestone, forming top of bluff	12 feet.
	(3) Blue massive fossiliferous limestone	5 "
	(2) Same as (4)	8 "
	(1) Dark blue limestone in slabs of three and four inches thick down to water's edge. This rock contains the fossils, *Graptolites*, and also ripple marks	6 "

The same were also seen out in the field, on the west side of the river. West of them and underlying them, a light yellowish gray granular limestone crops out. This last rock forms a low knoll in the field. The dip of these rocks is about 25° to southeast. In the bluff forming the west bank of the river just above Larkin's Ferry, and on the side of the high hill just west of the ferry, the following rocks were seen:

Section at Larkin's Ferry.

Nashville and Trenton	(5)	A hard compact argillaceous sandy limestone with divisions of a variegated siliceous shale. Some of the limestone is also variegated. The shale is of a gray, white and red colors......	90 feet.
	(4)	A dull blue shaly and laminated limestone occuring in ledges...	50 "
	(3)	A hard argillaceous ferruginous limestone	15 "
	(2)	A grayish and deep blue massive and compact limestone, becoming shaly in places, on weathering. It is also argillaceous in spots................................	40 "
	(1)	A deep blue laminated limestone.	8 "

The strata of the above section have a dip of 10° to 15° to the southeast The bluff is made up of the beds No. (5) with the exception of about ten feet at the base, formed of No. (4) which extends down to the water's edge.

The full thickness of No. (4) is shown in a hill just west of the ferry. On the eastern or river side of this hill, the bedded rocks are generally hidden by a mass of chert and pebbles, but along the road on the western slope, this bed is crossed, together with chert ridges and other characteristics of the underlying Quebec Dolomite.

The river at this ferry is quite wide, and on the eastern side there are no exposures of rocks, as the low level fertile lands extend out to the foot of the mountain.

Clinton—These rocks crop out near the edges of the anticlinal valley; but sections were obtained only in one or two localities.

On the northwestern side of the ridge, across the river and valley from Bridgeport, the following section was obtained:

Section opposite Bridgeport.

Siliceous	(16)	Loose fossiliferous chert covering top and southeastern side of ridge, with thin seams of chert cropping out near the top on the northwestern side	35	feet.
Black Shale	(15)	Decomposed shale	6	“
	(14)	Thin seams of chert, two inches thick, separated by shale	2	“
Clinton	(13)	A dirty or ashy gray colored sandy limestone in slabs of two inches thickness separated by shale	8	“
	(12)	A reddish argillaceous sandy limestone intermixed with shale	15	“
	(11)	Deep red loam covering the bedded rocks	20	“
	(10)	A variegated, very fossiliferous limestone	4	“
	(9)	Same as (11)	5	“
	(8)	A dark gray sandstone with small red flakes	1	“
	(7)	Same as (11) and (9)	5	“
	(6)	A shaly, light dove colored fossiliferous limestone, showing only	1	“
	(5)	Same as (11), (9) and (7)	6	“
	(4)	A bluff of a yellowish gray sandstone becoming a little shaly on exposure	15	“
Nashville	(3)	Deep blue, dove colored and ashy, massive limestones. These limestones are very fossiliferous and seem to become a little shaly on weathering. The deep blue variety is somewhat argillaceous and contains streaks of calcite.	15	“
	(2)	Bedded rocks, covered by soil	15	“
	(1)	Dark blue massive limestone to bottom of section		

The average dip of the beds in the preceding section is 15° to the southeast.

The ridge formed of the rocks of this section, is separated from Raccoon Mountain, by a deep narrow trough-like valvey, holding the calcareous rocks of the Sub-Carboniferous, formation. This valley follows the escarpment of Raccoon Mountain the entire length of the county.

About a mile and a quarter southeast of Scottsboro on the southwest side of *Back-bone Ridge*, (so called from a seam or back-bone of chert which runs along the top,) some fragments were observed of an impure iron ore imbedded in deep red loam, which was probably of this formation.

Black Shale.—In the last section above, is recorded one of the few exposures observed of this group.

In the chert ridges occurring on each side of the Anticlinal Valley, and formed of the Clinton, Black Shale and Siliceous group of the Sub-Carboniferous, the Shale, being softer and more easily denuded than the other beds, seldom appears on the surface.

Lower and Upper Siliceous.—On the chert ridges above mentioned, into the composition of which this formation enters, angular fragments of chert, usually more or less fossiliferous cover the sides of the ridges next to the Coal Measures.

Thus these chert fragments cover the northwestern side of the ridge, bordering on the west or northwest side, the anticlinal valley, in the southern portion of the county, and known as the Back-bone ridge; they also cover the southeastern side, which is the slanting side, of the ridge bordering the above valley on the east in the northeastern portion of the county. Both of the above ridges run northeast and southwest, and have the chert in beds or seams near their tops. The seam along the top of the western or *Back-bone* ridge, is almost perpendicular, or dips a little to the northwest whilst those which occur near the top of the eastern ridge, dip only 15° to southeast. The rocks of these formations are seen as a narrow belt, generally, all along the southeastern edge of the anticlinal valley, or along the foot of Raccoon Mountain, occasionally spreading out and forming fine bodies of land, (second bottom lands,) as is the case between the mouths of South Little Raccoon and Long Islands Creeks. Mrs. R. F. Hunter, who lives near the mouth of South Little Raccoon Creek, in S. 19, T. 3, R. 8 E. has in her collection, some fine specimens of the large coral Lithostrotion Canadense found in the upper rocks of this formation. In a cultivated field belonging to this farm, an earthern ware jar, containing a human skeleton has been plowed up. This field forms a part of one of those fine bodies of land above spoken of, as derived from this formation.

These rocks, south of the river, are limited to the above named narrow belt. North of the river, they are not so contracted, forming for the most part the large tracts of level and rolling lands between the mountain spurs of the southern portion of the county, and also the long narrow valleys which extend up the creeks almost to their heads. In S. 7, T. 4, R. 5 E., there is a deep oval basin, of a hundred acres or more, which extends down into the upper rocks of these formations. This basin is completely surrounded by mountain spurs, made up of the overlying formations, leaving no outlet above ground, for the waters falling in the basin. This water disappears or flows off through several sink holes in the southern portion of the basin, and hence this area is known as *the sinks*. These sink holes are believed to be connected with the blowing cave, near the foot of the incline from the coal mines of the Elkmont Coal and Railroad Company, and from which they are separated only by a dividing ridge. In this cave, there is said to be a stream of running water, which flows from the mouth of the cave only during wet seasons. In the western portion of the county, there are two narrow oblong basins, the waters of which escape by subterranean passages like that of the one just mentioned, and hence they, too, are known as *sinks*. These two basins are on a line with each other and with the valley of Dry Creek, and hence they might be termed merely an extension of this valley. They are divided from each other, and from the valley proper (of Dry Creek), by cross ridges. On the southern side of the lower (furthest south) of these ridges is a bluff at which ends the valley of Dry Creek.

At the base of this bluff is a cave known as the “Mouth of the Sinks” for the reason that during freshets, the water which disappears in the sinks above, emerges here.

At this place was obtained the following:

Section of bluff over Mouth of the Sinks.

Siliceous.	(3)	Light gray cherty limestone............	50 ft.
	(2)	An argillaceous cherty limestone becoming dark on weathering...........	8 “
	(1)	Same as (3). This is the rock in which the opening or cave occurs...............	4 “

The top of this bluff is perhaps 100 ft. below the crest of the crossing ridge.

Mountain Limestone.—Of the rocks of this county these are next in extent to those of the Coal Measures and are of the greatest thickness. It has already been said that they vary very much as to altitude, relative position, and comparative thickness and composition, and, in the absence of detailed sections, nothing more need be added to the general description already given.

Coal Measures.—With the exception of the narrow valleys along the creeks these rocks make up practically the upper or northern two-thirds part of the county. In the southern portion of the county, though forming a very prominent feature, occupying the tops of the mountains and the highest ridges and peaks, they are separated by numerous caves and extensive tracts of low, level, and rolling lands, derived from rocks of lower formations. They form more or less level areas, and terminate along their edges overlooking the valleys, in steep escarpments. In these escarpments, usually from 30 to 60 feet of the thickness of these rocks are exposed in perpendicular cliffs.

Split Rock Mountain, in the southwest, is said to be the highest mountain in the county. It is about one and a half miles long from north to south, and one and a fourth miles broad from east to west. It is, of course, capped by the rocks of this formation, and is said to contain a seam of coal 18 inches in thickness. The broad, flat mountain, just north of the M. and C. R. R., and between Paint Rock River on the west and Mud Creek on the east, has many high spurs branching off from it, and separated by deep coves. These deep coves, when running in from opposite sides, sometimes almost meet, and form what are known as *the narrows*. From the precipitous heights of these narrows, grand views can be had of the wild scenery near the head of the coves, and of ~~the~~ picturesque valley in the distance, 1,000 feet below. This mountain is covered with much fine timber of oak, hickory and chestnut, and shows numerous out-croppings of coal, especially along the foot of the bordering cliff. The coal varies in thickness from a few inches to about three feet. It is now being extensively worked by the Elkmont Coal and R. R. Co., in that portion of the mountain just north of Boyd's Switch. This company has a broad gauge railroad, about three miles long, running out to the foot of the incline, and connecting with the M. and C. R. R., at Boyd's Switch. It has also a narrow gauge railway, two or three miles long, running from the head of the incline or drum along a bench of the mountain to the different openings or mines. These openings are drifts, and are arranged along the narrow gauge road. At the time visited, they were at work in nine of these drifts.

This company not only furnishes with coal the M. and C. R. R. Co., and, to a great extent, the smaller cities on its line, but also ships a great deal to Memphis, and other large cities. It is a hard, free burning coal, and bears transportation well. The bluff above the coal seam is about 40 feet high. The coal has just above it a sandy shale, and just below it a laminated sandstone, the slabs from six to eight inches thick. The mountain, which is north or northeast of Stevenson, bordering the anticlinal valley on the west, has a seam of coal in it, which is said to be between two and three feet in thickness. This seam has a slight dip to the northwest, and is the one which the Huntsville Mining and Manufacturing Company had commenced to work just previons to the war. This company had built a tramway to their mines, connecting with the M. and C. R. R., at Bolivar Switch.

Raccoon Mountain, south of the Tennessee River, is from 15 to 20 miles broad, and shows frequent out-croppings of coal near the foot of the cliffs, running along the edge of the mountain next to the river. In S. 8, T. 3, R. 8, east, there is a seam of coal which is said to average 4 feet 6 inches in thickness. It was formerly worked by the Capertons, hauled down in wagons to the river, and shipped on flatboats to Chattanooga, etc. This mountain also shows in some places several seams of coal, one above the other. The following section was taken in S. 4, T. 4, R. 8, east, along Little Rocky Branch:

Section Along Little Rock Branch:

		feet,	inches.
(13)	Sandstone to lelvel plateau above	30	0
(12)	Shale	2	0
(11)	Coal	1	0
(10)	Fire clay	1	6
(9)	Sandstone and shale	20	0
(8)	Coal	0	10
(7)	Sandstone, cliff rock	50	0
(6)	Coal	1	6
(5)	Shale	0	6
(4)	Slaty coal	10	0
(3)	Slate		
(2)	Sandstone		
(1)	Mountain limestone		

No. (11) occurs on the side of the hill, some ten feet above the bed of the branch, and about one mile above the falls of the creek. No. (8) occurs along the bed of the branch about half way between No. (11) and the top of the cliff. No. (6) occurs in a rock-house just at foot of clif. Nos. (11) and (6) have been worked considerably by the neighboring blacksmiths, the coal from No. (6) having been carried on the back in baskets and bags, up a rickety ladder to the plateau above. No. (5) forms the floor of the rock-house, and on account of loose rock, its thickness could not be determined. No. (2) extends about half way down the mountain. Little Rock branch as it makes a clear leap of some thirty-five feet, presents a beautiful sight to an observer at the foot of the cliff.

The water here falls into the deep gorge excavated by South Little Raccoon Creek.

The gorge itself, with huge blocks of conglomerate and sandstone, as large as ordinary cabins, strewn along its sides, viewed from some of the lofty heights bordering upon it, is a wild and picturesque scene.

Coal will doubtless be found in all parts of the county in the positions given in the preceding section on Little Rocky Branch.

In the localities enumerated below, outcrops of coal were either observed by me, or were reported as occurring by reliable persons:

Section	27,	Township	2,	Range	3,	East.
"	3,	"	3,	"	3,	"
"	19, 23, 24, 26,	"	4,	"	3,	"
"	16, 32,	"	1,	"	5,	"
"	5, 8, 19,	"	2,	"	6,	"
"	28, 29,	"	4,	"	7,	"
"	4,	"	4,	"	8,	"
"	8,	"	3,	"	8,	"
"	1, 2, 29, 32,	"	1,	"	8,	"
"	22,	"	1,	"	9,	"

APPENDIX.

I.

ALTITUDE OF TRACK AT STATIONS

On the Mobile & Ohio Railroad, above mean low tide, Mobile, Ala.

STATIONS.	Miles from Mobile.	ALTITUDE Feet.
Mobile	0	6
Whistler	5	41
Chunchulla	18	78
Beaver Meadow	25.5	136
Citronelle, *summit*	32	333
Citronelle	33	317
Deer Park	43	148
State Line, Ala. and Miss	62.6	256
Buckatunna	70.8	150
Winchester	77.4	165
Waynesboro	82.5	191
Limestone	86.9	....
Shubuta	96.4	197
DeSoto	104.4	210
Quitman	109.1	231
Enterprise	120.1	248
Okatibbee	129.8	....
Meridian	135	336
Marion	140.1	....
Lockhart	146.8	360
Lockhart, *summit*	"	426
Lauderdale	153.3	213
Tamola	158.5	....
Narkeeta	163.7	183
Sucarnochee	168.9	225
Scooba	176.2	193
Wahalak	182.5	187
Shuqulak	188.3	221
Macon	197.8	185
Brooksville	206.1	275
Crawford	211.1	316
Artesia	219.2	244
Mayhew	224.1	213
Tibbee	227	207
West Point	232.5	243
Muldon	241.3	304
Prairie	243.7	311
Egypt	253.8	306
Okalona	261.5	311
Shannon	269.3	249
Verona	274.7	307
Tupelo	279.2	280
Saltillo	287.5	318
Guntown	292.3	386

ALTITUDE OF TRACK—CONTINUED.

STATIONS.	Miles from Mobile.	ALTITUDE Feet.
Baldwyn	297.4	379
Booneville	308.6	511
Booneville, *summit*	"	513
Rienzi	316.7	441
Corinth, Miss	328.8	441
Ramer, Tenn	340.8	416
Grove Hill, Clarke county, six miles from G. Trunk Railroad	....	512

II.

ELEVATIONS AT GRADE LINE

On Mobile & Alabama Grand Trunk Railroad above mean low tide in Mobile Bay.

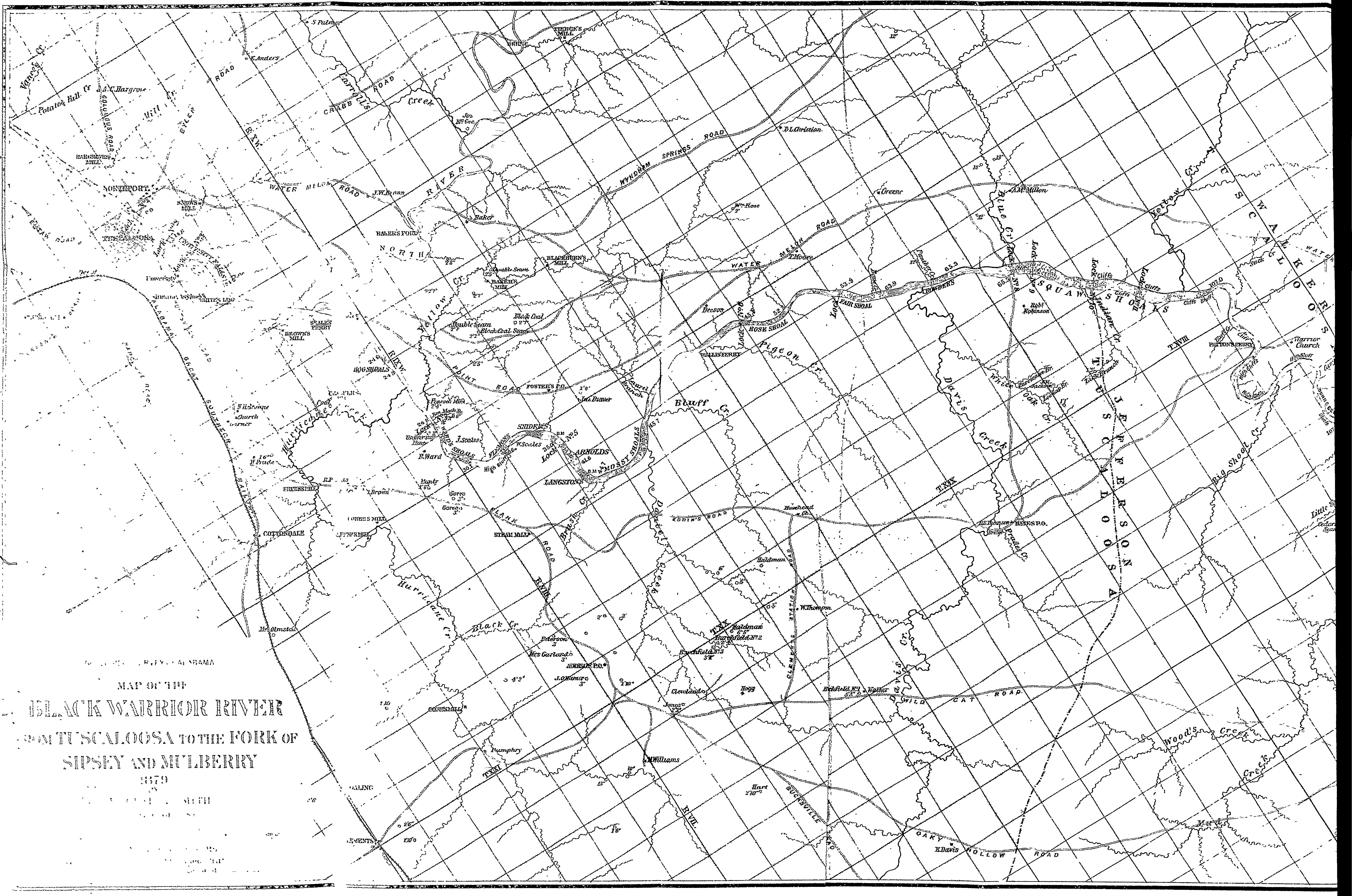
PLACES ON LINE.	Distances from Mobile.	Feet Elevation.	REMARKS.
Mobile, Beauregard St	0	6	
Plateau Station	3	37	
Cleveland Station	8.7	15	
Creola Station	14	23	
Mount Vernon Station	29	49	
Slade's Station	44	54	
Tombigbee, at bridge	57	42.5	
" height of bank		27	
" river mean low tide		2	
T. 9, R. 4E., S. 29, 3 miles east Grove Hill	81	192	
Summit Grade Head Basset's Creek	94.1	352	T. 11N, R. 3E, S. 25
Hampden, Marengo county	110.25	180.1	
Divide, Alabama and Tombigbee	122.90	190.9	
Ala. Cen. R. R. crossing, Uniontown	138	273.6	
Selma & Greensboro R. R. cross'g, Marion	153	253	
Mount Nebo, Tunnel at Grade	158.6	330	
" " Summit of Mount	158.6	449	T. 20N, R. 7E, S. 24
Old Town Creek, Cahaba Valley	163	195	
West Bank Cahaba, opposite Centreville	183.35	252	
Mouth Shade's Creek	201	319	T. 26N, R. 11E, S. 28
Head Shade's Creek	213.2	485.6	T. 27N, R. 11E, S. 9
Gracie's Gap, Grade	227.5	690	
" " Summit	227.5	716.5	T. 29N, R. 12E, S. 11
Birmingham	232	580	At Grade G.T.R.R.

III. ALTITUDES OF STATIONS

On the Alabama Great Southern Railroad, above Sea Level.

STATIONS.		ALTITUDE
Chattanooga	(Tenn.)	665 feet.
Wauhatchie	“	671 “
Trenton	(Ga.)	720 “
Dademont	“	813 “
Rising Fawn	“	778 “
Sulphur Springs	“	888 “
Eureka	(Ala.)	960 “
Valley Head	“	1012 “
Holliman's	“	918 “
Fort Payne	“	864 “
Brandon	“	877 “
Collinsville	“	719 “
Greenwood	“	672 “
Reese's	“	580 “
Attalla	“	583 “
Steele's	“	591 “
Whitney	“	594 “
Springville	“	708 “
Trussville	“	683 “
Birmingham	“	577 “
Jonesboro	“	508 “
McCalla	“	466 “
Tannehill	“	466 “
Williams' Cross Roads	“	495 “
Standiford	“	555 “
Greenpond	“	472 “
Woodstock	“	500 “
Vance's	“	495 “
Smallwood's	“	410 “
Clements'	“	400 “
Olmstead	“	269 “
Cottondale	“	254 “
Tuskaloosa	“	162 “
Maxwell's	“	157 “
Hull's	“	122 “
Battle's	“	133 “
Carthage	“	157 “
Stewart's	“	140 “
Akran	“	130 “
Eutaw	“	170 “
Harpville	“	167 “
Boligee	“	104 “
Epes	“	110 “
Brown's Cut	“	225 “
Livingston	“	125 “
York	“	140 “
Cuba	“	200 “
Toomsuba	(Miss.)	276 “
Russell's	“	393 “
Meridian	“	319 “

Altitudes of Stations in *italics* are approximated.



[illegible] SURVEY [illegible] ALABAMA

MAP OF THE

BLACK WARRIOR RIVER

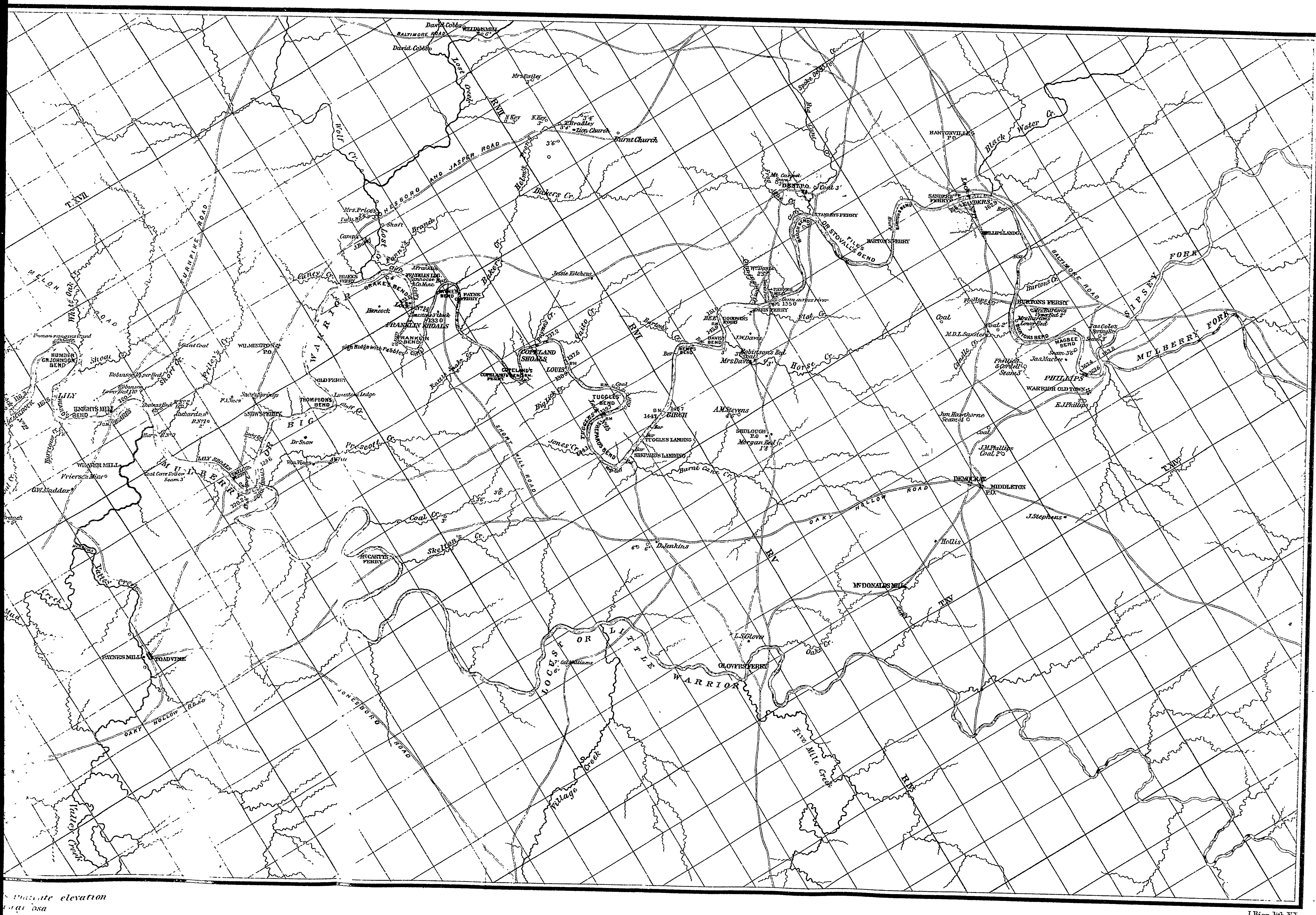
FROM TUSCALOOSA TO THE FORK OF SIPSEY AND MULBERRY

1879

BY

[illegible] SMITH

Note Figures at head and foot of Shoa
above low water mark at T



s Plateau elevation

...aloosa

J.Bien, lith NY